Transport and Accessibility Impact Assessment

Liverpool Boys and Girls High School Upgrade Project

Prepared for NSW Department of Education

17 February 2025

241253

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Revision Register

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Executive Summary

This Transport and Accessibility Impact Assessment (TAIA) accompanies a Review of Environmental Factors pursuant to Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the construction and operation of the permanent new co-educational Liverpool Boys and Girls High School (LBGHS) on the existing Liverpool Boys High School (LBHS) and Liverpool Girls High School (LGHS) site.

The redevelopment of the high school will accommodate a maximum capacity of 2,000 students and 214 staff, with an anticipated opening year enrolment of approximately 1,200 students and 166 staff. The proposed development is not intended to typically intensify existing conditions but rather is delivering key service upgrades. Therefore, the student and staff demand are anticipated to be very similar to existing demands in opening year and typically align with the existing approved maximum capacity for future years.

The redevelopment of the high school is intended to be constructed in stages. Stage 1 consists of the existing LBHS being relocated to a temporary school during construction Stage 1 is subject to a separate application. Stage 2 is the new and operational co-ed LBGHS, which is included as part of this proposal. Given there are existing schools currently on the site it is expected that transport behaviours in opening year will be relatively similar to existing conditions. However, as part of the redevelopment, this presents an opportunity to change existing travel habits for both students and staff. These are expected to improve over time as the population of the school grows which has been considered throughout the development of a transport strategy for this site.

The holistic transport strategy for the project prioritises active transport (i.e. walking and cycling) and public transport over private vehicle movements. This is consistent with NSW state government policy and is a core part of the NSW Department of Education's ongoing commitment to sustainable transport across its portfolio of projects. The overall transport strategy across all elements of the project have been discussed with The Liverpool City Council ('Council') and Transport for NSW (TfNSW) during a pre-lodgement consultation stream of Transport Working Group (TWG) meetings.

As the site currently accommodates two existing schools, the infrastructure such as pedestrian footpaths and crossings are well developed. However, the project is seeking to use the opportunities presented by the redevelopment of the site to improve existing travel behaviour. In order to encourage and prioritise active transport, it is proposed to upgrade the existing infrastructure and provide some new external infrastructure improvements such as pedestrian crossings along the frontage of the site, along with internal infrastructure including bicycle storage and end-of-trip facilities. The scope of these works has been developed through the TWG consultation. The scope of works to be provided as part of this REF proposal will operate in conjunction with existing infrastructure and will connect to the broader network of existing public domain infrastructure throughout Liverpool City Centre.

For cyclists, the project will provide 200 on-site bicycle storage spaces for students and an additional 22 spaces for staff, complying with the Liverpool Development Control Plan 2008. Unisex shower and change rooms for staff, with lockers will also be provided on-site. These provisions are broadly in line with the NSW Planning Guidelines for Walking and Cycling and would meet future demand levels with a shift to more sustainable transport modes.

Public transport will be a substantial part of the high school's operation and is currently provided along Forbes Street. Proposals to extend the 819 bus service to accommodate the school and facilitate students who live within the northwestern portion of the catchment, between Elizabeth Drive and Cumberland Highway area have been considered as part of this proposal.

In addition, the existing 160 metre bus zone will be shortened slightly to accommodate 2 accessible kiss and drop bays near the main school entrance on Forbes Street. From our analysis these minor changes to the existing bus zone will have a negligible impact on public transport servicing the site.

The high school proposes 2 on-site servicing / waste collection areas and 1 on-street loading bay. Waste collection will be serviced at the shared waste collection within Gulyangarri Public School (GPS) at the southern side of the GPS car park and can be accessed via Lachlan Street. The existing waste loading area can accommodate vehicles up to and including a 10.5 metre waste truck. The servicing loading dock will be

located at the western part of the school which can accommodate 8.8 metre Medium Rigid Vehicle (MRV) and can be accessed through Forbes Street. The proposed on-street loading bay along Lachlan Street will also accommodate vehicles up to an 8.8 metre MRV and will be utilised by couriers dropping off items to the main school reception. The on-site loading dock access will be controlled by a sliding gate and can be accessed with intercom facilities. All of the loading dock is open, with no overhead obstructions or height limitations.

Drop-off and pick-up by car (“kiss & ride”) will also be catered for at the site, however, is a low priority mode in the sustainable transport hierarchy. Therefore, it will be discouraged and supplemented by active and public transport options. The proposal involves the relocation of the existing 78 metre K&R area on Forbes Street to the southern side of Lachlan Street to provide a dedicated 68 metre new K&R zone. There is also an existing 24 metre K&R zone along the southern side of Lachlan Street, adjacent to GPS which is also intended to be utilised by LBGHS, providing a total available length of 92 metres of on-street K&R zones. No change to the existing GPS internal K&R area is included as part of this proposal. Relocation of the K&R zone will have no impact on the existing GPS pick-up and drop-off arrangements due to staggered bell times between LBGHS and GPS. These zones have been designed in accordance with AS2890.5 for on-street parking facilities. Additionally, the project will provide 2 accessible parking bays to provide transport functionality for the special education learning units (SELU), which will be located on the eastern side of Forbes Street, close to the main access. These accessible parking will be designed in accordance with AS 2890.6.

Car parking is the lowest priority travel mode for the project. The proposed high school on-site car park with a capacity of 112 spaces (including 2 accessible parking spaces) is designed to accommodate 50% of staff once the school reaches full capacity. The car park will provide a 67% provision for staff in opening year. Whilst this is a departure from the existing 93% staff car travel mode split, this is considered acceptable and is in line with the projects' objectives of reducing private car travel, further details are provided within Section 10.

It is proposed that the implementation of a School Transport Plan (submitted separately as part of this REF), and the provision of active and public transport infrastructure such as end-of-trip facilities for staff, will assist in shifting staff and student travel behaviour as the school population grows over time (such as reducing staff car driver mode split from 93% to 50%). This shift to a lower car driver mode split is a deliberate strategy as part of the sustainable transport goals. It has been implemented for a number of reasons including provision of acceptable and sufficient quantities of on-site play space, reductions in hardstand space to avoid urban heat island effects, limiting vehicle movements to reduce congestion, and reducing the carbon emissions of staff travel to and from the site. This shift over time is expected to coincide with gradual growth of the school population over time. In line with NSW Department of Education (DOE) policy, no car parking will be provided for students or visitors to the site.

To ensure the safety of pedestrians in the vicinity while maintaining appropriate vehicular traffic flows, a package of off-site public domain works will be provided as part of this development. These include upgrading 2 existing pedestrian refuges at the western and eastern leg of Forbes Street / Lachlan Street intersection, footpath widening along the northern side of Lachlan St, relocating an existing pedestrian wombat crossing at Forbes Street, 1 new pedestrian refuges at the northern leg of Forbes Street / Lachlan Street intersection, to be implemented prior to occupation. In addition, the reversal of priority at the Lachlan Street / Forbes Street intersection and the left-in left-out restrictions at the northern approach of Lachlan Street are also required as part of Stage 2 GPS (Condition D7, D7A SSD-10391). As part of the GPS approval, a right turn ban is also required once GPS reaches full capacity, on the southern approach of Lachlan Street / Forbes Street. A detailed assessment has been completed under Section 11 to confirm if these works are required prior to GPS Stage 2 as part of this proposal.

To analyse the traffic impact of the proposed development on the existing traffic network, intersection movement counts were conducted at various locations in the vicinity of the site. The traffic counts were completed in August 2024. In addition, to understand existing travel patterns to / from the existing LGHS and LBHS travel mode surveys were conducted for both students and staff. The results showed 28% of students travel to school via car passenger and 2% drive to school during the AM, while 23% of students travel from school via car passenger and 2% drive from school during the PM. Staff results showed 93% of staff currently drive to / from school and 1% of staff travel as a car passenger during both the AM and PM. To provide a conservative assessment these baseline travel mode scenarios were applied to the net increase in students and staff to determine the uplift in traffic. The results indicated there would be no increase in traffic in the opening year as LBGHS is intended to operate with similar student and staff numbers to the existing LGHS and LBHS. When the school reaches maximum capacity, which is anticipated to be 2041 as per SINSW enrolment forecasts, using the baseline travel mode splits as a conservative assessment an additional 274 (137 in, 137 out) student vehicles during the AM peak and an additional 226 (113 in, 113 out) student vehicles during the PM peak are proposed. Similarly, no additional traffic generation for staff is intended in the opening year, while the school reaches maximum capacity an additional 45 (45 in, 0 out) staff vehicles during the AM peak and 45 (0 in, 45 out) staff vehicles during the PM peak are proposed.

Cumulative traffic and intersection upgrades as a result of surrounding approved developments (GPS SSD 10391 and LHR SSD 10389) have also been assessed as part of this proposal. This approach was considered the most conservative approach to ensure all approved external works would be captured as part of the traffic assessment.

The traffic modelling results are included and detailed in Section 11, in summary, all existing intersections currently operate between a level of service (LoS) A-C which is considered satisfactory during the AM and PM peak periods. However, the Lachlan Street / Forbes Street intersection is nearing capacity in the AM peak, this is particularly due to right turn movements from Lachlan Street to Forbes Street. In 2028 opening year, all intersections typically operate similar to existing conditions with the exception of Lachlan Street / Forbes Street intersection in the AM increasing to a LoS D. A 10-year post-opening assessment was also completed, applying the maximum capacity of LBGHS. The majority of intersections continue to operate at a satisfactory LoS A-C with the exception of Lachlan Street / Forbes Street which is operating at LoS F in the AM and E in the PM. To improve this intersection a mitigation measure was implemented to restrict right turn movements from Forbes Street to Lachlan Street. These results show the Forbes Street to Lachlan Street intersection will improve to a LoS A in the AM and B in the PM with this mitigation measure. In summary, whilst the traffic modelling scenarios completed a conservative approach and included cumulative intersection upgrades, a separate scenario was completed to confirm what impact the LBGHS would have on the surrounding road network. Similarly, at maximum capacity, the Lachlan Street / Forbes Street intersection is operating at LoS F in the AM and E in the PM, therefore even without GPS meeting it's Stage 2 capacity right turn restrictions are required to ensure Lachlan Street / Forbes Street can continue to operate at a satisfactory level of service.

Overall, the transport provisions of this project across all travel modes have been selected and developed in order to provide a sustainable, safe, and efficient site. These provisions include physical infrastructure works on and off-site, along with management measures to be implemented during operation of the school. While school sites generate significant volumes of travel demand in short periods of time, the proposed transport strategy is considered an appropriate balance and is demonstrated to provide appropriate outcomes for the site.

Contents

Section 1 Introduction

1.1 Scope Of Works

This Transport and Accessibility Impact Assessment has been prepared by TTW on behalf the NSW Department of Education (the Applicant) to assess the potential environmental impacts that could arise from the redevelopment of the Liverpool Boys High School and Liverpool Girls High School, at 18 Forbes Street, Liverpool NSW, 2170 (the site).

This report is prepared for the permanent new co-ed Liverpool Boys and Girls High School (LBGHS) on the existing Liverpool Boys High School (LBHS) and Liverpool Girls High School (LGHS) site. This report has been prepared to assess and address the traffic and transport impacts of the proposed redevelopment and define the key traffic-related design elements of the proposal.

This report accompanies a Review of Environment Factors (REF) that seeks approval for redeveloping the LGHS and LBHS into a single co-educational school, including:

[redacted]

- Staged construction and operation of a six-storey school building, including school hall and gymnasium;
- Associated parking and building services;
- Construction of 112 staff car parking spaces, on-site waste storage and loading area to accommodate a 10.5 metre waste truck
- Tree removal;
- Associated landscaping and play spaces;
- Augmentation of service infrastructure; and
- Associated off-site infrastructure works to support the school, including (but not limited to) services, kiss and drop point and pedestrian crossings.

Refer to the Review of Environmental Factors prepared by Ethos Urban for a full description of works.

A Preliminary School Transport Plan (STP) and a Preliminary Construction Traffic Management Plan (CTMP) have been prepared and included as part of this REF application. These plans satisfy REF requirements however are considered preliminary in nature and would be finalised post-approval as a mitigation measure.

The new LBGHS has an anticipated opening year of 2028, facilitating existing student demands in the interim, with an ultimate student capacity of 2,000 students. The redevelopment will be completed in stages, Stage 1 consists of the existing LBHS being relocated to a temporary school during construction. The temporary school is located on the existing site, to the south of GPS and east of LGHS and is part of a separate planning application.

1.2 Statement of Significance

Based on the identification of potential issues, and an assessment of the nature and extent of the impacts of the proposed development, it is determined that:

- The extent and nature of potential impacts are moderate, and will not have significant adverse effects on the locality, community and the environment;
- Potential impacts can be appropriately mitigated or managed to ensure that there is minimal effect on the locality community.

1.3 Transport Assessment Basis

As previously mentioned, the proposed development is not intended to typically intensify existing conditions but rather is delivering key service upgrades. Therefore, the student and staff demands are anticipated to be very similar to existing demands in opening year and typically align with the existing approved maximum capacity for future years.

Table 1 details the existing student and staff population and approved maximum capacity for both LBHS and LGHS. It also shows the future student and staff projections in 2028, opening year and maximum capacity for the new co-ed LBGHS.

Table 1: Existing & Proposed School Enrolment & Capacity

	Existing				**Anticipated Enrolments Co-ed LBGHS**	
	LBHS (2024)		**LGHS (2024)**		**Opening Year (2028)**	**Full Capacity (2041)**
	2024 Enrolment	Approved Capacity	2024 Enrolment	Approved Capacity		
Students	501	900	715	960	1,200	2,000
Staff	85	97	81	103	166	214

As shown in Table 1, the existing schools currently have an approved capacity of 1,860 students (900 + 960 students) and 200 staff (97 + 103 staff). However, the existing schools are currently operating with a total of 1,216 students (501 + 715 students) and 166 staff (85 + 81 staff).

The proposed development has an opening year enrolment projection of 1,200 students and 166 staff with a maximum capacity of 2,000 students and 214 staff. It is noteworthy to mention, SINSW enrolment projections anticipate maximum school capacity will not be achieved until approximately 2041.

1.4 Operational Details

It is anticipated the proposed school will operate with very similar characteristics to the existing schools. The following breakdown of school operation hours shown in Table 2 provides an overview of the anticipated school activities throughout a typical school calendar year.

Table 2: Operational Details

Activities	Operating hours
School bell times	8:50am Monday – Friday 3:10pm Monday – Friday
School hours – use of all school facilities	Between 8:00am and 4:00pm (exact school hours within this timeframe to be confirmed by school prior to operation), Monday to Friday.
Waste collection	Between 6:00am and 7:30pm, Monday to Friday.
Cleaning & maintenance	5:00am to 9:00am and 3:00pm to 6:00pm

1.5 School Catchment

No change is proposed to the existing school catchment boundary as part of the proposal. The school catchment boundary has an approximate radius of 2.0 kilometres and the site is generally located centrally within the catchment area. The existing school catchment boundary is shown in Figure 1.

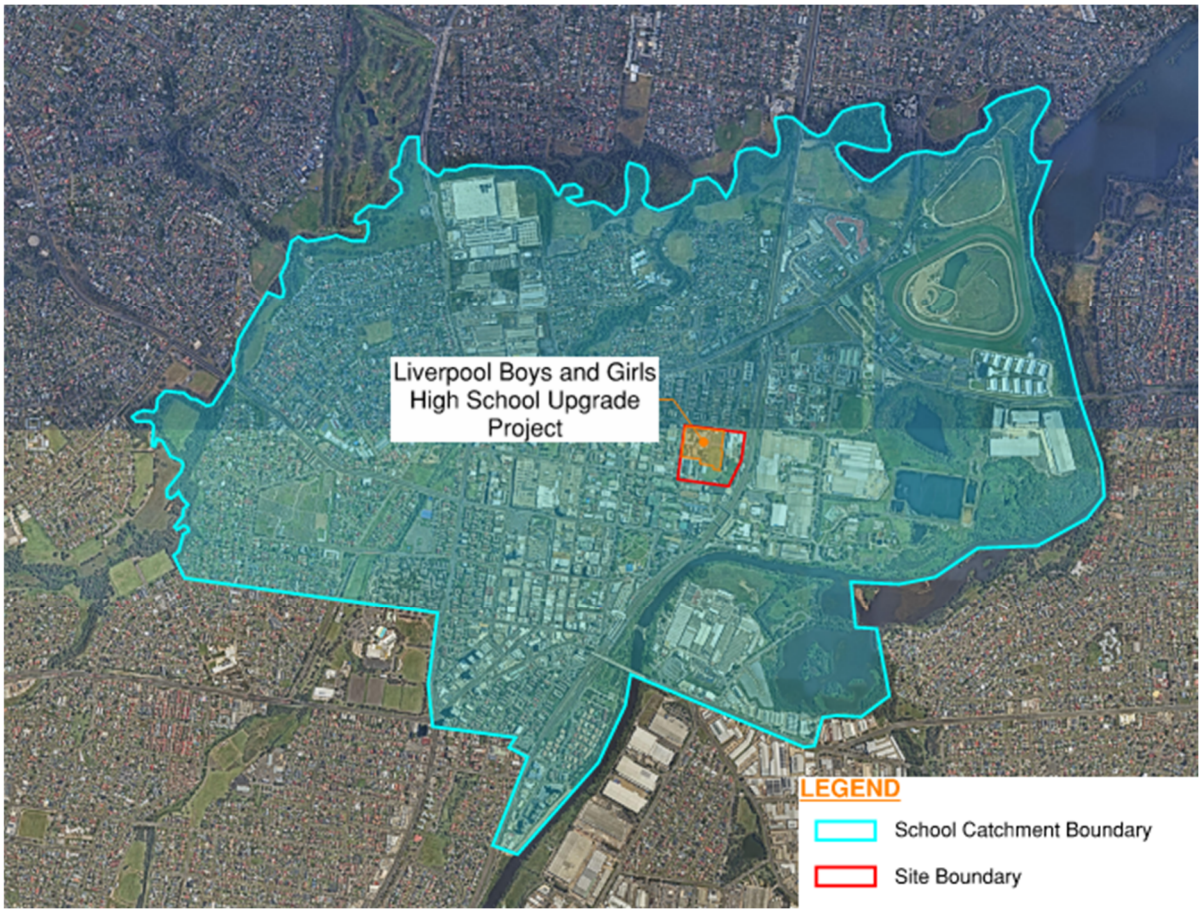


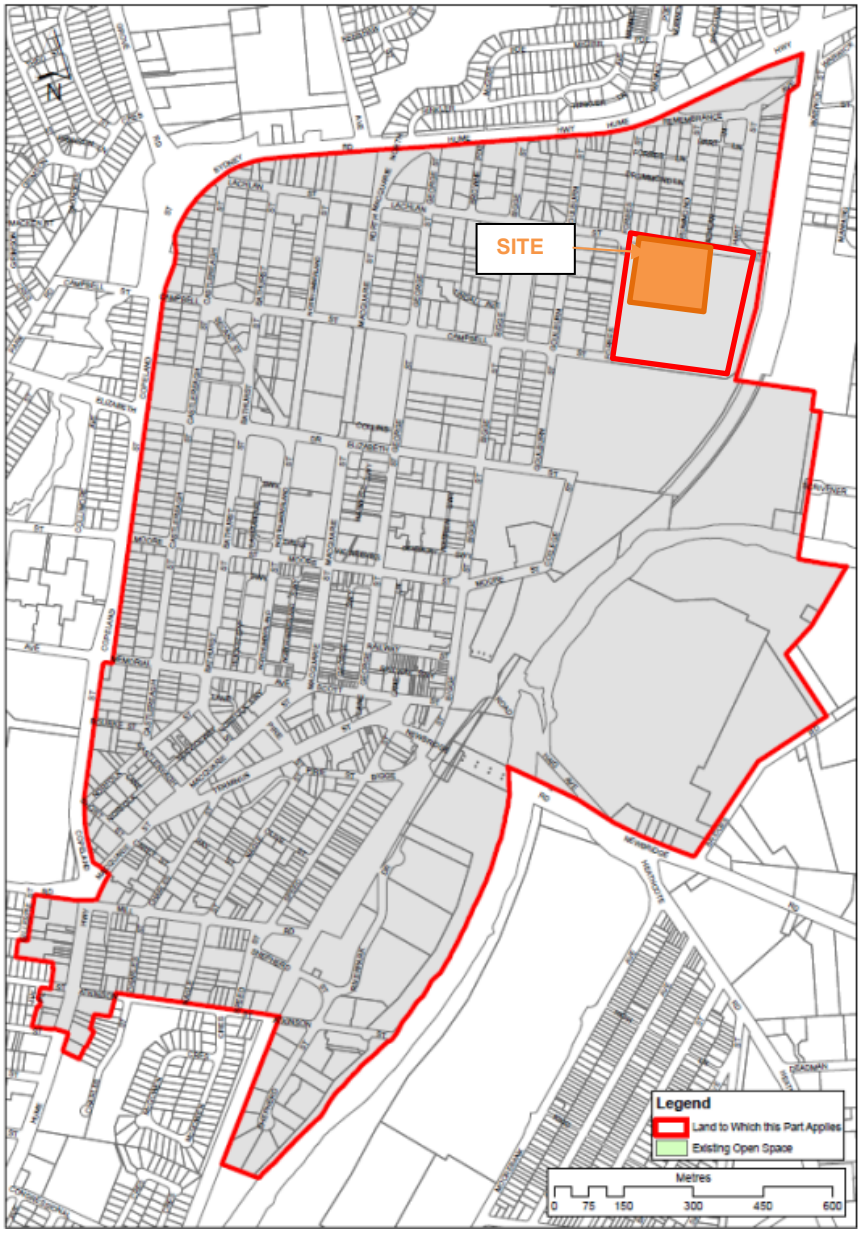
Figure 1: Existing School Catchment Boundary
Source: Modified from Nearmap

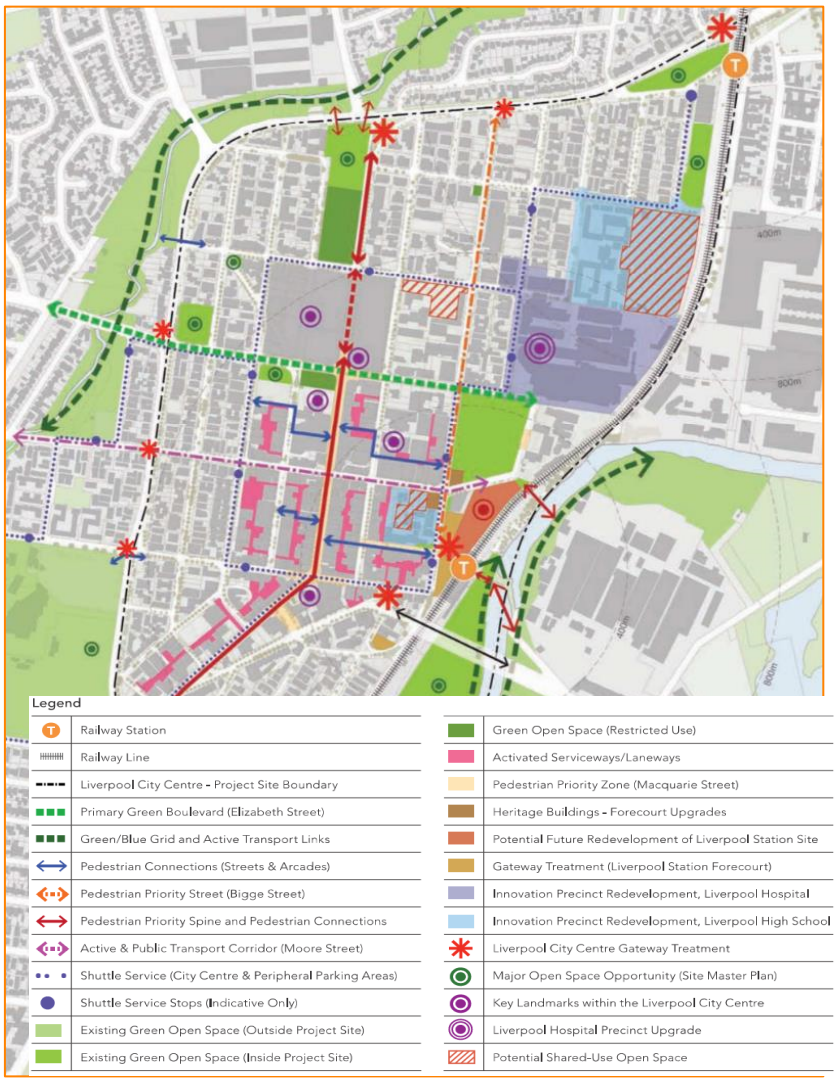
1.6 Strategic Planning Context

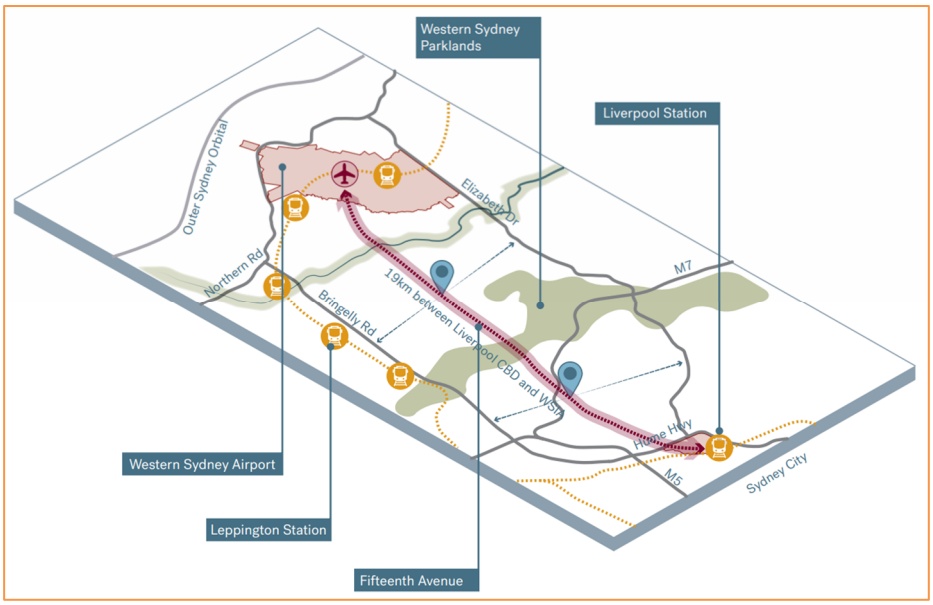
1.6.1 Environmental Planning Instruments and Planning Policies

Table 3 outlines the relevant strategic plans and strategies related to the traffic and transport assessment of this project, including relevant planning strategies and opportunities within the Liverpool LGA and Liverpool City Centre.

Table 3: Relevant Strategic Context

Legislation	Comment
Liverpool Development Control Plan 2008	This document contains general controls for all developments within the Liverpool LGA and is referred to within this report as 'Liverpool DCP 2008'.
Liverpool DCP 2008 – Part 4 – Development in Liverpool City Centre	This sub document from LDCP relates to development on the land known as Liverpool City Centre, which includes the LBGHS site as shown in the figure below. 

Legislation	Comment
Liverpool City Centre Public Domain Masterplan	This document is Liverpool Council's 10-year vision to guide the development of public space and a more vibrant city centre. The school site is located within the Liverpool City Centre and therefore reference has been made to this document. This document is referred to within this report as 'LCC PD Masterplan'. Wider footpaths, dedicated cycleways, more street trees and vegetation, public art, better furniture, pedestrian lighting and new paving materials are among the improvements suggested in the plan that will improve accessibility and amenity. The plan provides a cohesive approach to development in the city centre and a useful set of standards for Council, private developers and local businesses, with 76 Council projects in the pipeline to provide meaningful work during construction. The below Figure provides an overview of the proposed public domain upgrades within the Liverpool City Centre Structure Plan. 
Liverpool Local Environmental Plan 2008	This legal document applies to land in Liverpool LGA which contains development standards and is referred to as 'the LEP' within this report.

Legislation	Comment
Liverpool Bike Plan 2018 – 2023	This document contains information about existing and proposed bicycle infrastructure within Liverpool and is designed to promote cycling and increase the number of bike users.
Liverpool Health and Education Innovation Sub-Precinct	A Structure Plan has been developed by Woods Bagot in June 2022 to review options for development within the Liverpool Health and Education Sub-Precinct. From a transport perspective the Structure Plan seeks to provide key pedestrian through site connections from the residential areas to the north and the Hospital Precinct to the south of the site.
Fifteenth Ave Smart Transit Corridor	Council's flagship project, the Fifteenth Avenue Smart Transit (FAST) Corridor, is a visionary city-shaping project to deliver a high-quality public transport link between the Liverpool CBD and Western Sydney International Airport. Under the Western Sydney City Deal, the NSW Government has committed to a rapid bus connection between the Airport, the new Aerotropolis and Liverpool's CBD in time for the airport's opening in 2026. TfNSW is also planning to upgrade Hoxton Park Road to provide dedicated bus lanes between Banks Road at Miller and Cowpasture Road at West Hoxton. This will connect with the FAST Corridor. Council has begun early design work on its preferred corridor option, and funding has recently been approved by both the Australian and State Government, no further details on corridor delivery timing have been provided at the time of writing this report. 

1.6.2 External Developments

A further assessment has been undertaken to evaluate the cumulative impacts of the LBGHS and any potential neighbouring properties further details are included below in Table 4.

Table 4: Neighbouring Developments

No.	Address	Development Application number and status	Scope of works
1	Lot 501 in DP1165217	SSD-10388 Finished and operational	The application for the Liverpool Hospital Multi-storey Car Park (MSCP) was approved on 30 November 2020. The Liverpool Health and Academic Precinct (LHAP) redevelopment has additional traffic generated from the new MSCP. This recently completed eight-level car park provides approximately 1,244 parking spaces and is now operational, with its traffic generation already accounted for in the background traffic surveys.
2	Lot 501 in DP1165217	SSD-10389 Approved	The application for the Liverpool Hospital Precinct Main Works was approved on 30 November 2020. The Liverpool Health and Academic Precinct (LHAP) redevelopment application is for the construction and operation of a new multi-storey Integrated Services Building providing new treatment and support services that will integrate with the existing hospital. The traffic generation is already accounted for in the background traffic surveys.
3	Lot 1 DP 1137425 18 Forbes Street	SSD – 10391 Finished and operational	The application was approved on 30 November 2020. The Gulyangarri Public School (GPS) opened in early 2024, with the preschool opening in Term 4 2024. The school currently has enrolments of 209 students including preschool students, with a Stage 1 capacity of up to 580 students and a full capacity of 1,280 students at Stage 2. At the time of writing this report, GPS is currently in Stage 1. Stage 2 development has not been constructed and is currently not funded as confirmed by SINSW. However, as the school is located in near proximity to LBGHS, the GPS Stage 2 development will be reviewed and incorporated into the traffic analysis of this project to assess the most conservative scenario. The impact of the GPS stage 2 development and the mitigation measure will be further detailed in Section 11.2.1 and Section 12 of this report, respectively.

For all the above developments listed in Table 4, it is assumed that the mitigation measures for those developments (as determined through their respective assessment processes) will be implemented at an appropriate point in time for those developments. Our assessment has considered whether the LBGHS proposal requires us to bring forward any of the approved traffic mitigation measures. Relevant external developments (either approved or under assessment) are illustrated in Figure 2. Section 11 of this report provides detailed discussions in relation to the cumulative traffic impacts.

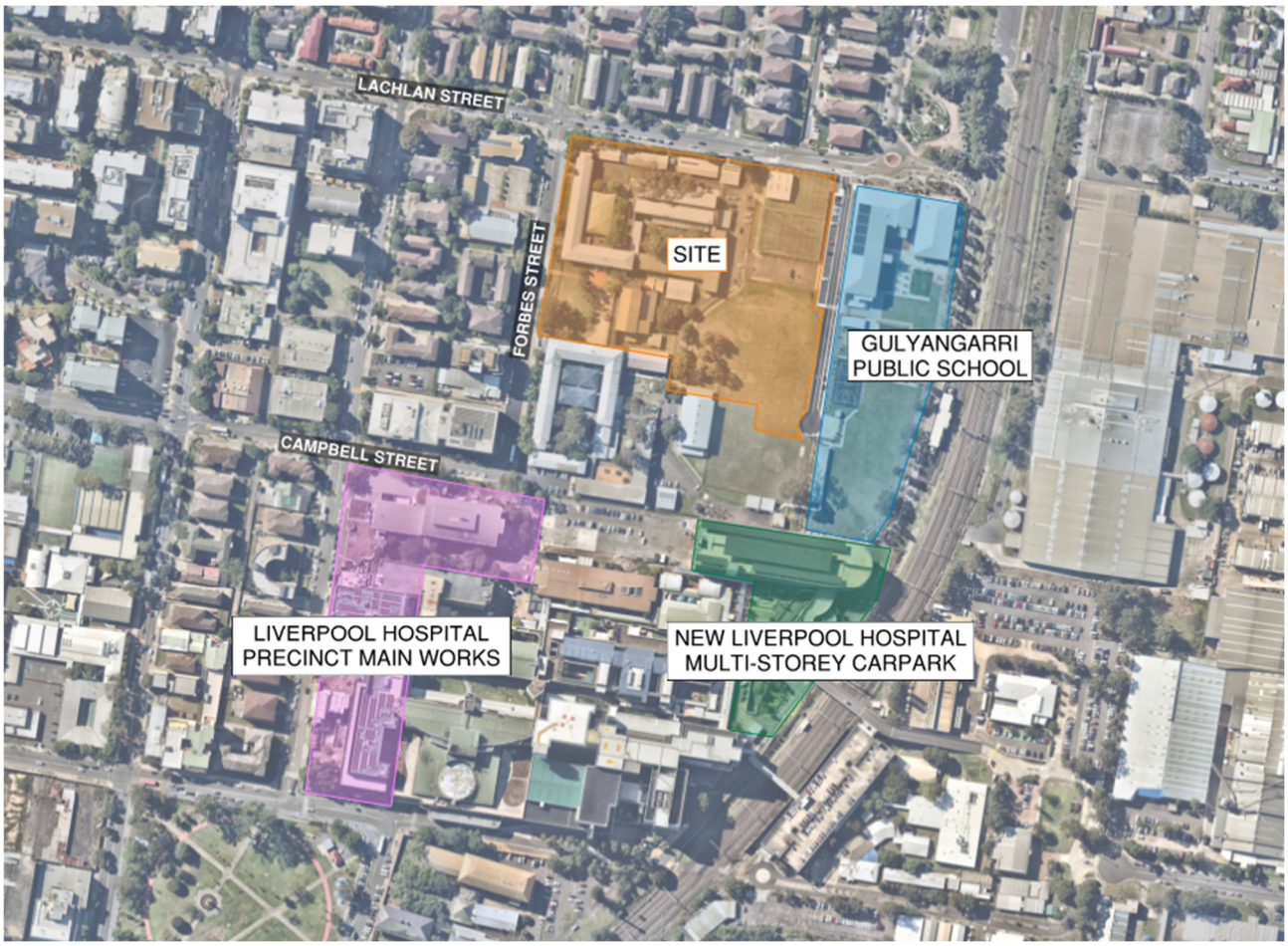


Figure 2: External Developments
Source: Modified from Nearmap

1.7 Codes, Standards & References

The traffic and transport strategy for the project has been prepared in the context of a variety of relevant codes, standards, and references listed below.

- Australian Standard AS 2890.1-2004, Part 1: Off-Street Car Parking (AS 2890.1).
- Australian Standard AS 2890.2-2018, Part 2: Off-Street Commercial Vehicle Facilities (AS 2890.2).
- Australian Standard AS 2890.5-2020, Part 5: On-street Parking (AS 2890.5)
- Australian Standard AS 2890.6-2022, Part 6: Off-Street Parking for People with Disabilities (AS 2890.6).
- RMS Guide to Traffic Generating Development 2002 (RMS Guide).
- Liverpool Local Environmental Plan 2008 (Liverpool LEP 2008).
- The Liverpool Development Control Plan (LDCP) 2008 – Part 1 - General controls for all developments
- The Liverpool Development Control Plan (LDCP) 2008 - Part 4 – Developments in Liverpool City Centre
- State Environmental Planning Policy (Transport & Infrastructure) 2021 (SEPP Transport & Infrastructure 2021).
- Liverpool City Centre Public Domain Master Plan - June 2020
- Walking Cycling Guidelines 2022-2023 - Transport for NSW.
- NSW Future Transport Strategy 2056.
- Liverpool Bike Plan 2008-2023.

1.8 Consultation

This report has been prepared following consultation between the design team and relevant stakeholders, including Liverpool City Council (Council), South Western Sydney Local Health District (SWSLHD) and Transport for New South Wales (TfNSW). Consultation events and outcomes are identified in Table 5.

Table 5: Consultation Summary

Date	Attendees	Discussions	Outcomes
19 December 2024	SWSLHD SINSW, NBRS, Colliers, Ethos Urban TTW	A consultation meeting was held with the SWSLHD with regard to the new LBGHS being constructed next to Liverpool Hospital. The overview of the discussion is shown below: ▪ A high level overview of the project, the staging design and the overall design for the temporary boys school ▪ The design for the public domain, parking and traffic design for the new LBGHS, and potential relocation of the GPS children's pedestrian crossing In general, SWSLHD is in support with the project, a few queries have been requested to ensure the project is running smoothly while Liverpool Hospital is in operation. The queries of the discussion are shown below: ▪ A disruption notice regarding the mobile crane location for temp school construction to be submitted to LHD prior to temp school commencement. The project team will inform any notices to LHD prior to any construction. ▪ Queries about the treatments along eastern, southern boundaries and Campbell Street between the proposed temp school and Liverpool Hospital. The project team will liaise with LHD to provide further information.	▪ As part of this TAIA report SWSLHD has been considered. ▪ No additional traffic or parking items were requested during this meeting
17 December 2024	Council, SINSW, NBRS, Colliers, Ethos Urban TTW	A consultation meeting was held with Council with regard to the new LBGHS project with the intention to get feedback on the project design, landscape and transport upgrades. The overview discussion is shown below: ▪ Discussion about school catchment not changing once LBHS and LGHS have been combined, resulting in very similar travel patterns to existing ▪ A discussion about the proposed bell times for LBGHS and consideration for staggering the bell times between GPS ▪ A discussion of the proposed K&D location on Lachlan Street for LBGHS. TTW reiterated no change to the existing GPS on-site K&D activities will be included as part of this application. ▪ The existing school crossing on Lachlan Street was discussed, it was recommended this crossing is patrolled during LBGHS morning and afternoon periods also.	▪ Existing and proposed future growth has been considered as part of the traffic and parking analysis refer to Section 10 and Section 11 ▪ An analysis of the proposed relocation of the K&D location is included in Section 9

Date	Attendees	Discussions	Outcomes
17 September 2024	Transport Working Group (Council + TfNSW)	A Transport Working Group (TWG) meeting was held with Council and TfNSW with regards to the design, infrastructure upgrades, and transport mode for Liverpool co-ed school redevelopment. As part of the meeting, TTW provided an overview of the proposed LBGHS school, details included: ▪ Project overview and project update ▪ School student location analysis and future student's travel mode ▪ Proposed transport provision ▪ Discussion on public domain works by the council and Liverpool Hospital ▪ Proposed public domain works by SINSW ▪ Discussion on proposed bus services to the school Council and TfNSW are both supportive of the transport upgrades as part of the LBGHS redevelopment. Key feedback included advice about exploring additional resources to encourage active transport and a comprehensive travel guide in the School Transport Plan. ▪ Council provided additional comments in relation to ensuring the proposal incorporated traffic modelling to capture the distribution of traffic as a result of the proposed relocation of the K&R area from Forbes Street to Lachlan Street. Council also requested future year modelling scenarios to incorporate Stage 2 development of GPS as cumulative traffic.	▪ A preliminary STP has been prepared as part of this REF submission ▪ Both traffic modelling scenarios as requested by Council have been included in the LBGHS traffic assessment and is further detailed in Section 11
29 May 2023	Transport Working Group (Council + TfNSW)	A TWG meeting was held with Council and TfNSW with regards to the Rapid Transport assessment for LBGHS project. The TWG meeting was held by Stantec and the overview of the discussion is shown below: ▪ A discussion of the Intake area, school location, and Scenarios between a single-gender school or a co-ed school ▪ Analysis of the walking, cycling, and public transport catchment ▪ A review of mode shares for both single-gender school and co-ed scenario ▪ A discussion of the initial site access to the proposed school	▪ Section 3.2 and 3.3 included details of proposed on-site and off-site works

1.9 REF Deliverable Requirement

The NSW Guidelines for preparing a REF were reviewed to ensure the traffic and parking requirements were met in this report. Table 6 below identifies the typical requirements that need to be met for a school planning submission and identifies where they have been addressed in various sections of this report.

Table 6: REF Reporting Requirements

Issue and Assessment Requirements	Section Reference
An analysis of the existing transport network, including the road hierarchy, any pedestrian, bicycle or public transport infrastructure, current daily and peak hour vehicle movements, parking restrictions and existing performance levels of nearby intersections.	Road hierarchy – Section 2.2 Pedestrian infrastructure – Section 2.3 Cyclist infrastructure – Section 2.4 Public transport – Section 2.5 Parking restriction – Section 2.6 Current vehicle movements – Section 2.7 Existing intersection performance – Section 2.7
An analysis of the likely demand for parking having regard to target mode share for car parking, bicycle parking and end-of-trip facilities	Vehicular access – Section 3 Pedestrian access – Section 5 Cyclist analysis and facilities – Section 6 Parking analysis and facilities – Section 10
An assessment of the expected demand of the private pick up and drop off and assessing the capacity of the proposed private vehicle pick up / drop off to accommodate the demand	Drop-off and pick-up zones – Section 9
An assessment of the expected bus pick up and drop off demand based on the expected target mode share and an assessment of the capacity of the existing and proposed bus zone to accommodate the demand	Bus demand analysis and provision – Section 7
An assessment of the access arrangement for service vehicle (i.e garbage and other deliveries) and emergency vehicle	Vehicular access – Section 3 Service vehicles – Section 8 Swept path analysis – Appendix C

Issue and Assessment Requirements	Section Reference
An analysis of the impacts of the proposed development (including justification for the methodology used), including predicted modal split, a forecast of additional daily and peak hour multimodal network flows as a result of the development (using industry standard modelling), potential queuing in drop-off/pick-up zones and bus bays during peak periods, identification of potential traffic impacts on road capacity, intersection performance and road safety (including pedestrian and cyclist conflict), potential impacts to Gulyangarri Public School and Liverpool Hospital and any cumulative impact from surrounding approved developments.	Forecast modal split – Section 4 Multi-modal trip generation – Section 4 Public transport – Section 7 Drop-off and pick-up zones – Section 9 Car parking – Section 10 Traffic impacts – Section 11 Cumulative impact – Section 11.2
Evidence of consultation with NSW Health and Council regarding the potential closure of Campbell Street between Forbes Street and Goulbourn Street is closed and an analysis of the impacts of the proposed development if this road is closed.	Campbell Street closure – Section 11.3.4
Measures to mitigate any traffic impacts, including details of any new or upgraded infrastructure to achieve acceptable performance and safety, and the timing, viability and mechanisms (including proposed arrangements with local councils or government agencies) of delivery of any infrastructure improvements in accordance with relevant standards.	Mitigation measures – Section 12 Infrastructure upgrades – Section 3 Operations and Management – Section 1.4
Measures to promote sustainable travel choices for employees, students and visitors, such as connections into existing walking and cycling networks, minimising car parking provision, encouraging car share and public transport, providing adequate bicycle parking and high quality end-of-trip facilities, and implementing a Green Travel Plan.	Refer to the Preliminary School Transport Plan
A preliminary operational traffic and access management plan for the development, including drop-off/pick-up zones, number of bus movements, bus bays and their operations.	Refer to the Preliminary School Transport Plan
A preliminary construction management plan that details management and mitigation measures to minimise impacts and ensure the safety of road users and pedestrians	Refer to the Preliminary Construction Traffic Management Plan

Issue and Assessment Requirements	Section Reference
Traffic Counts Assessment This must include assessment of the school's impacts on the surrounding road network. Counts should not be undertaken close to school holidays or long weekends. Vehicle counts should be undertaken during a typical day to provide an accurate understanding of the existing traffic conditions.	Existing Traffic Count – Section 2.7

Section 2 Existing Conditions

2.1 Site Overview

The site is located at 18 Forbes Street, Liverpool, within the Liverpool Local Government Area (LGA). The site is legally described as Lot 1 DP1137425 and has a total area of approximately 74,973m^2.

The site comprises a broadly rectangular portion of land which currently contains the existing LBHS, LGHS, and the GPS, which commenced operations in January 2024 and is located to the east of the wider site.

The site's western portion contains LBHS and LGHS. LGHS in the site's southwest comprises three, two-storey buildings. LBHS in the site's northwest, comprises approximately four, two-storey buildings, with adjacent at-grade carparking and various sports courts. Once LBGHS is redeveloped land to the south is intended to be vacant. An aerial image of the site is shown at Figure 3 below

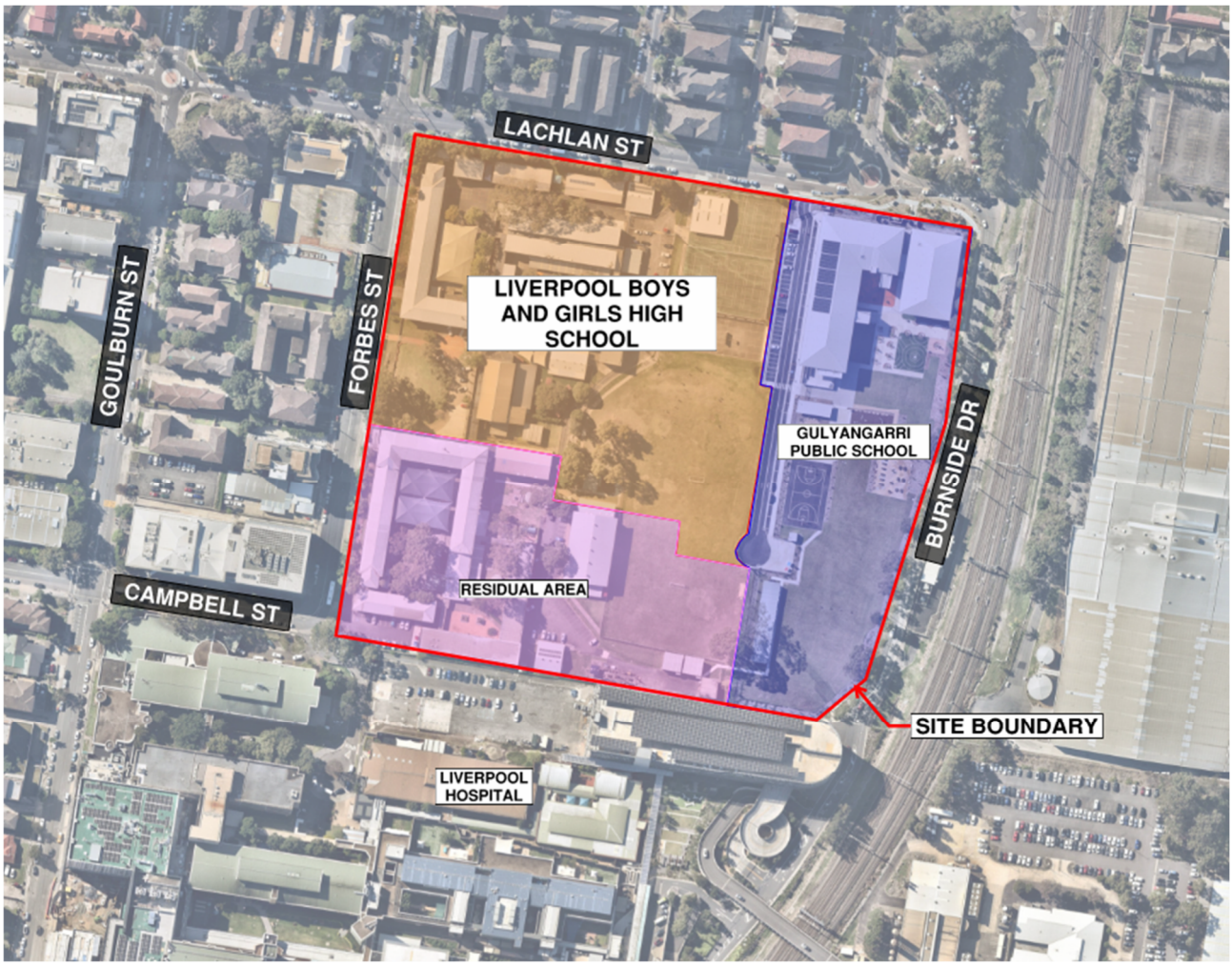


Figure 3: Site Plan

Source; Modified from Nearmap

The site is located within the Liverpool CBD, specifically within the Liverpool Health and Academic Precinct and there are a range of health and educational facilities in its surrounding area. The site is located within an extremely accessible area with the closest bus stops located less than 100 metres west along Forbes Street. Warwick Farm and Liverpool Train Stations are also 500 metres and 900 metres from the site respectively. Figure 4 provides a wider overview of the site's location.

Figure 4: Site Location

Source: Modified from Nearmap

2.2 Road Hierarchy

The key local and state roads within the vicinity of the site are described below in in Table 7.

Table 7: Road Hierarchy

Road Name	Classification	Speed Limit	Road Geometry
Hume Highway	State Road (HW 2)	70 km/h	2-3 lanes in each direction within a 20 metre carriageway
Moore Street	State Road (Transit Way)	50 km/h	2 lanes in each direction, 1 designated for general traffic and 1 designated for buses.
Campbell Street	Local Road	40 km/h	1-2 lanes in each direction within a 12 metre carriageway
Forbes Street	Local Road	40 km/h	A single lane of traffic in each direction within a 12.5 metre carriageway
Lachlan Street	Local Road	40 km/h	A single lane of traffic in each direction within a 6 metre carriageway
Burnside Drive	Private Road (owned by Liverpool Hospital)	50 km/h	A single lane of traffic in each direction within a 8 metre carriageway
Elizabeth Street	Local Road	40 km/h	1-2 lanes in each direction within a 12 metre carriageway

As shown above in Table 7, the site is located close to Hume Highway, which is classified as a state road, running from Parramatta Road, Ashfield in the east to the Victorian State Border in the south. This road provides a good connection to the wider road network throughout NSW.

The site is also surrounded by a number of local roads including Lachlan Street to the north, Forbes Street to the west and Burnside Drive to the east. Further details are provided below in Figure 5.

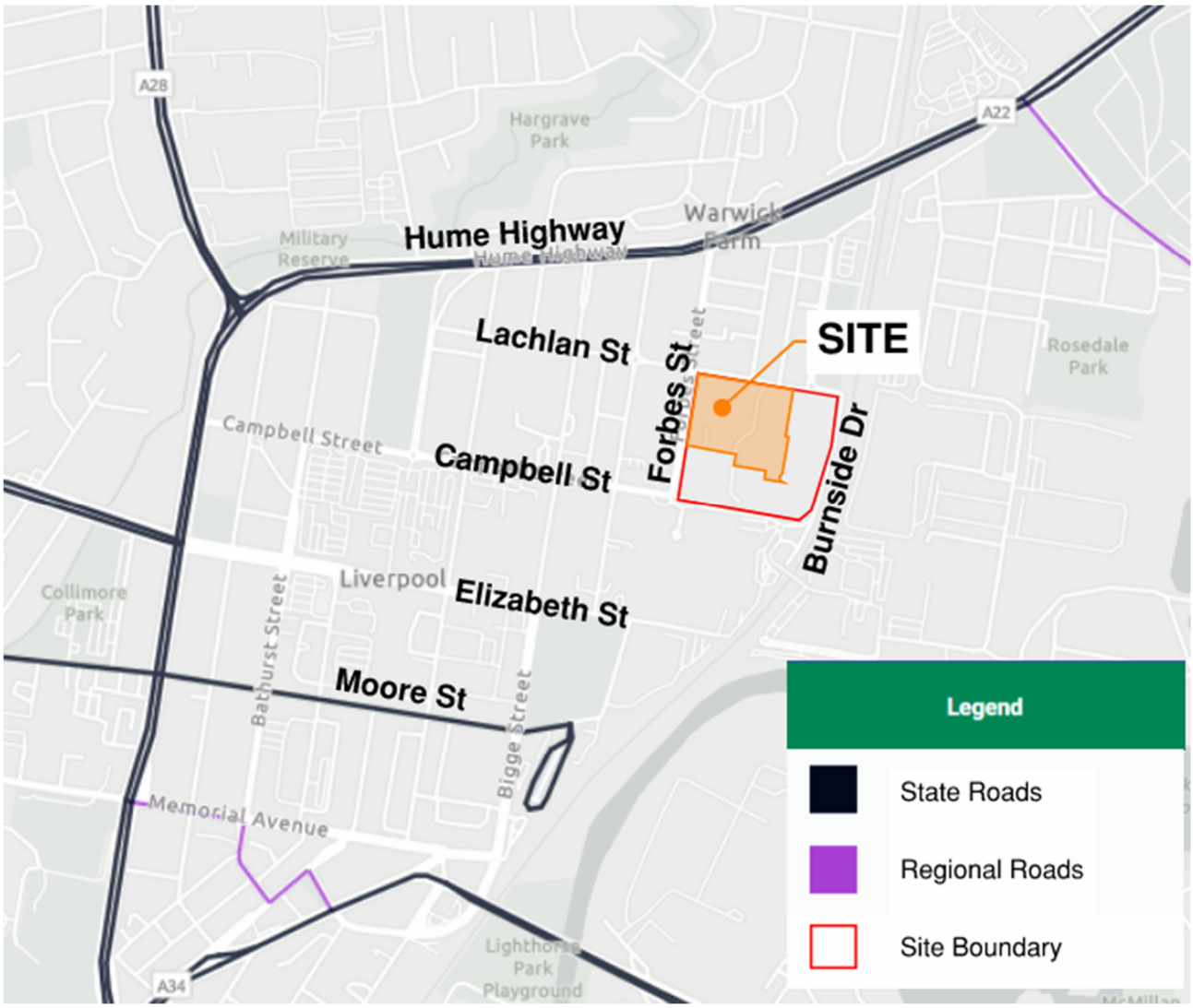


Figure 5: Existing Road Classification
Source: Modified from NSW Road Network Classification

2.3 Pedestrian Infrastructure

Figure 6 shows an overview of the existing pedestrian infrastructure within a 1.2-kilometre radius (or 15-minute walking distance) of the site. Currently, pedestrian infrastructure facilities within the vicinity of the site are extremely good. The footpaths in the local area range from 1.5 metres to 3 metres in width.

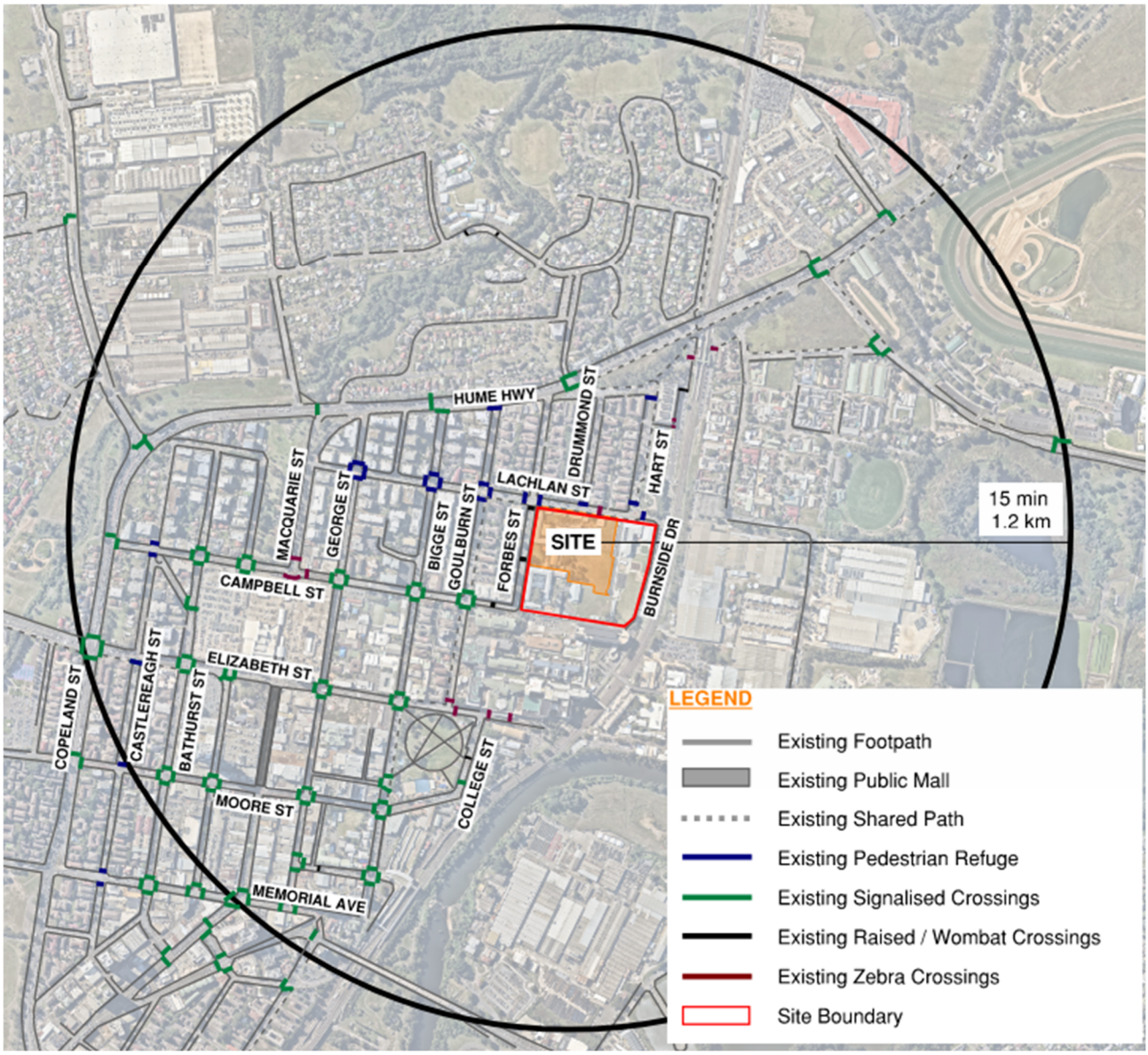


Figure 6: Local Pedestrian Infrastructure
Source: Modified from Nearmap

From review of Figure 6, within the vicinity of the site there are a number of pedestrian crossing facilities, including the following:

- 3 wombat crossings, along Campbell Street and Forbes Street respectively.
- 2 pedestrian refuge crossings at the intersection of Forbes Street and Lachlan Street.
- 1 patrolled school crossing along Forbes Street, to the west of GPS.
- 3 additional pedestrian refuge crossings at the intersection of Lachlan Street and Hart Street, and Lachlan Street and Drummond Street.

2.4 Cyclist Infrastructure

Figure 7 shows the local cycling routes near the site according to the Cycleway Finder website. The area has good access to the local bicycle network with several on-road and off-road cycle paths within the vicinity of the site. There are existing off-road shared path facilities along the northern and western boundaries of the site on Lachlan Street and Forbes Street providing connectivity to Warwick Farm Railway Station and Liverpool Railway Station.

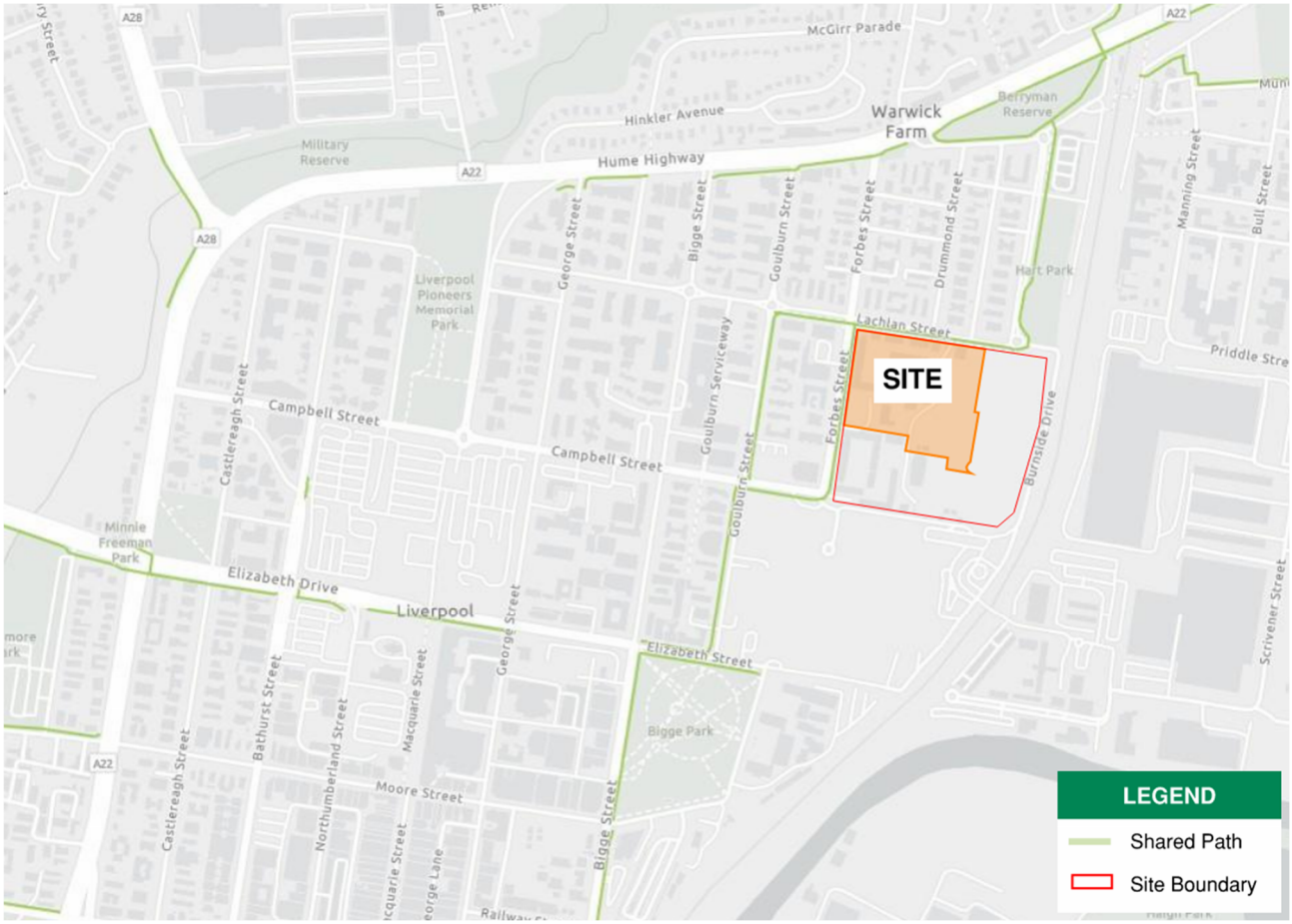


Figure 7: Local Cycling Infrastructure
Source: Modified from Cycleway Finder

To strengthen active transport modes connectivity throughout Liverpool LGA, the Liverpool Bike Plan 2018 – 2023 was developed by Council. With specific reference to the site, the plan proposes off-road cycle paths along the remainder of Forbes Street, connecting with Hume Highway and the western portion of Lachlan Street also connecting with Hume Highway. These proposed shared paths will provide good cycling connections from the school and to the wider bicycle network.

From discussions with Council these proposed upgrades have not yet been allocated within the cost plan and it is unclear when they will be delivered.

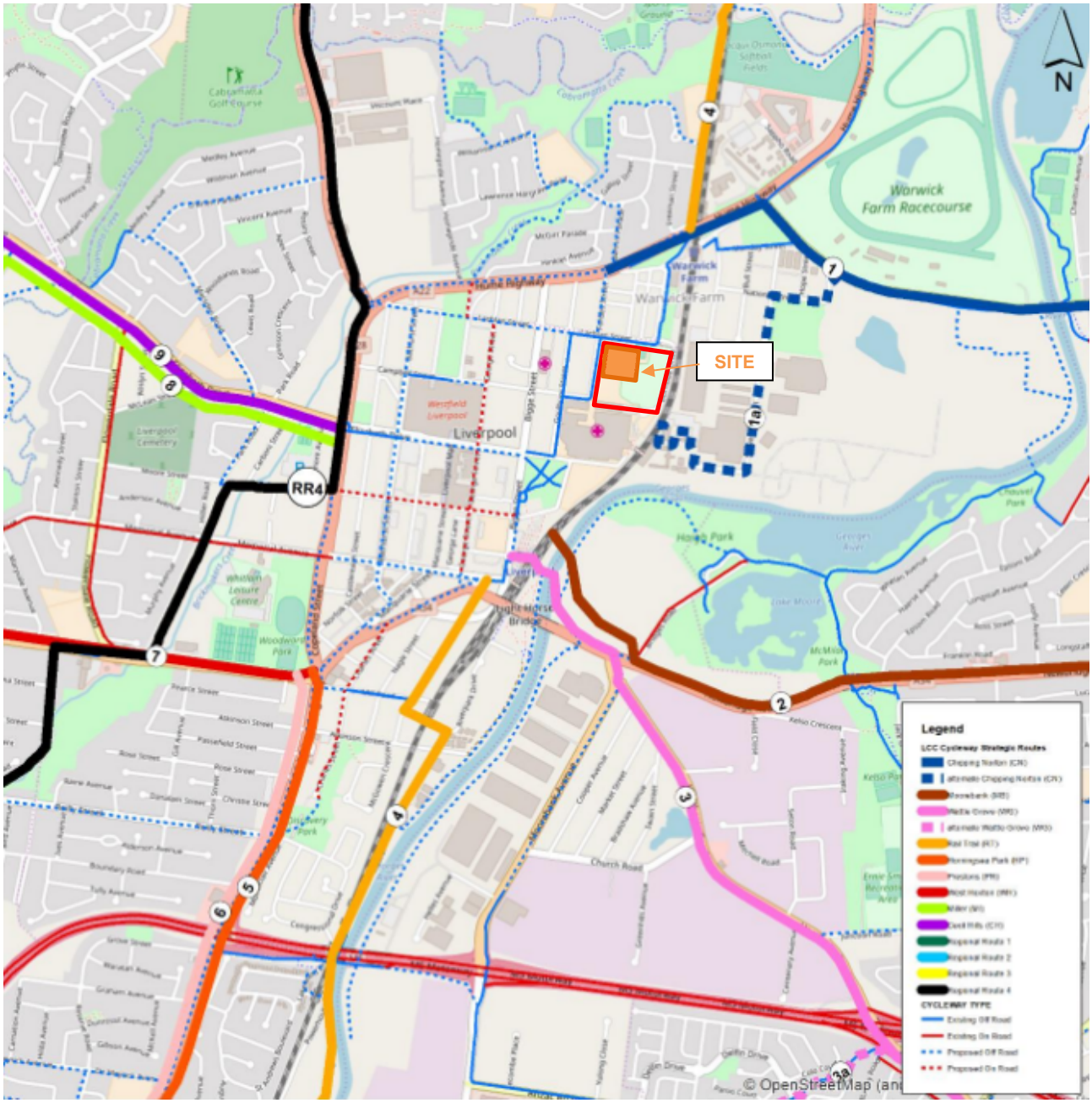


Figure 8: Liverpool Bike Plan 2008-2023

2.5 Public Transport

2.5.1 Bus

Within the proximity of the site there are a number of bus stops within a 400-metre walking distance of the site. Specifically, there is a 160-metre bus zone along Forbes Street at the western frontage of the site. This bus zone is the main bus zone utilised by the school and is serviced by several public and school bus services.

There is also a new 50 metre bus zone to the north of the site, along Lachlan Street. This bus zone was recently installed as part of the new GPS, however currently does not service any public or school services. Table 8 below provides details of bus services and average headways within 400 metres of the site. Figure 9 and Figure 10 also provide an overview of the school and public bus routes respectively.

Table 8: Public & School Bus Services

Bus Route Number	Bus Route	Average Headway	
		AM/PM Peak	Off-Peak
Public Bus Services			
823	Liverpool Interchange to Warwick Farm (Loop service)	30 minutes / 30 minutes	1 hour
851	Liverpool to Carnes Hill Marketplace via Cowpasture Road	None / 20 minutes	1 hour
852	Carnes Hill Marketplace to Liverpool via Greenway Drive and Cowpasture Road	30 minutes / 30 minutes	1 hour
853	Liverpool to Carnes Hill via Hoxton Park Road	20 minutes / 20 minutes	1 hour
854	Liverpool to Carnes Hills Via Greenway Drive and Hoxton Park Road	15 minutes / 15 minutes	1 hour
855	Rutleigh Park via Austral & Leppington Station	1 AM service	1-2 hours
856	Bringelly to Liverpool	2 AM services / 2 PM services	2 AM services / 2 PM services
857	Liverpool to Narellan	30 minutes / 30 minutes	1 hour
865	Casula to Liverpool via Lurnea Shops	30 minutes / 30 minutes	30 minutes
866	Casula to Liverpool	30 minutes / 30 minutes	30 minutes
869	Ingleburn to Liverpool via Edmondson Park & Prestons	30 minutes / 30 minutes	30 minutes
870	Campbelltown to Liverpool via Glenfield	30 minutes / 30 minutes	1 hour
871	Campbelltown to Liverpool	30 minutes / 30 minutes	1 hour
872	Campbelltown to Liverpool via Macquarie Fields	30 minutes / 30 minutes	30 minutes
School Bus Services			
AM Services			
1005	Bringelly & Allenby to Liverpool Schools	1 daily service at 8:11am	
1048	Denham Court to Liverpool	1 daily service at 8:26am	
1051	Greenway Park, Hoxton Park to Liverpool	1 daily service at 8:27am	
9311	Hinchinbrook to Liverpool high schools via Mount Pritchard	1 daily service at 8:05am	
PM Services			
2022	All Saints School to Prestons	1 daily service at 3:42pm	
2024	All Saints Schools to Lurnea & Casula	1 daily service at 3:40pm	
2034	All Saints HS to Leppington	1 daily service at 3:18pm	
2080	Clancy College to Prestons & Casula	1 daily service at 3:44pm	
9621	Liverpool High School to Smithfield via Bossley Park	1 daily service at 3:15pm	
9703	Good Shepherd Catholic Primary School Hoxton Park to Miller via Liverpool	1 daily service at 3:33pm	

Bus Route Number	Bus Route	Average Headway
9805	Green Valley Public School to Mount Pritchard via Liverpool	1 daily service at 3:33pm
9810	Thomas Hassall Anglican College to Ashcroft via Liverpool	1 daily service at 3:36pm

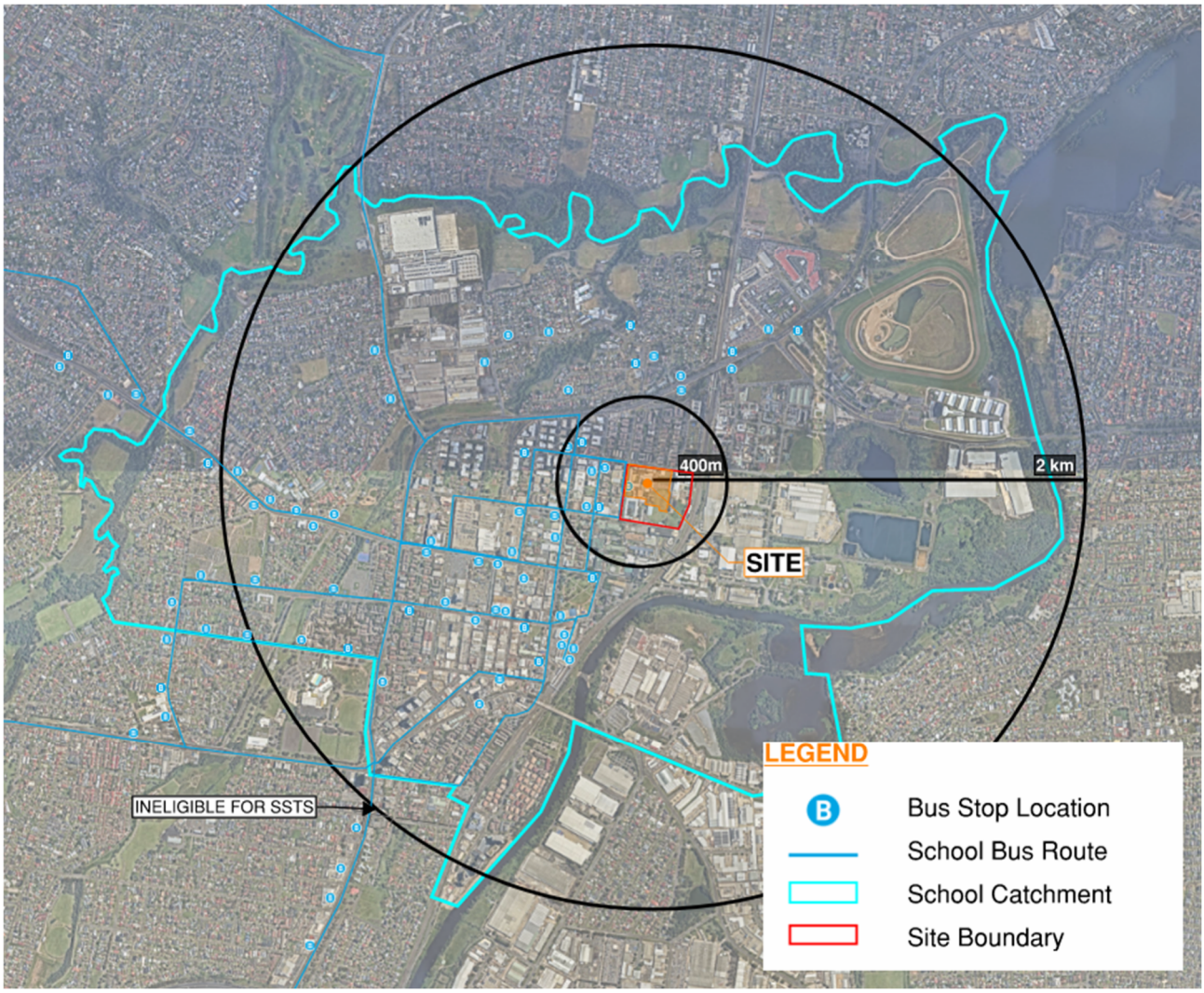


Figure 9: Existing School Bus Routes Near the Site
Source: Modified from Nearmap

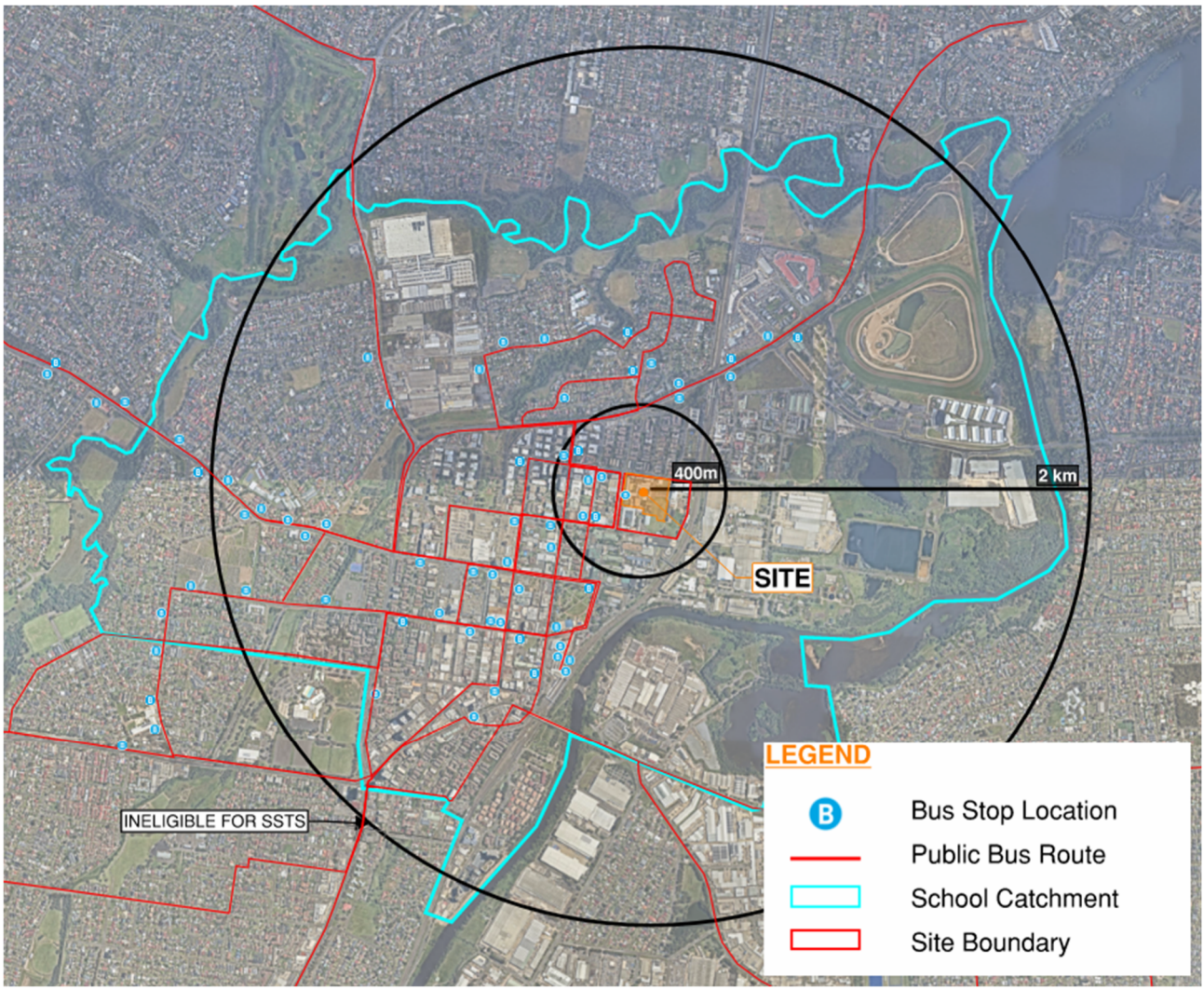


Figure 10: Existing Public Bus Routes Near the Site
Source: Modified from Nearmap

2.5.2 Rail Services

The integrated Public Transport Service Planning Guidelines, Sydney Metropolitan Area, states that the walking catchment for rail services includes all areas within an 800-metre radius of a railway station. As shown by Figure 11 and Figure 12, Warwick Farm Station is within 500 metres of the site, therefore falling within the walking catchment area. Liverpool Station is also approximately 900 metres from the site and is also considered to be utilised by staff and for journeys to / from the site. Table 9 below shows the average service headways during the peak and off-peak periods.

Table 9: Frequency of Train Services

Railway Line	Railway Route	Frequency
T2	Inner West & Leppington Line	5 -10 minutes during peak hours 10 minutes during off peak hours
T3	Bankstown Line	10 minutes during peak hours 30 minutes during off peak hours
T5	Cumberland Line	15 minutes during peak hours 30 minutes during off peak hours

Figure 11: Rail Services
Source: Modified from Nearmap

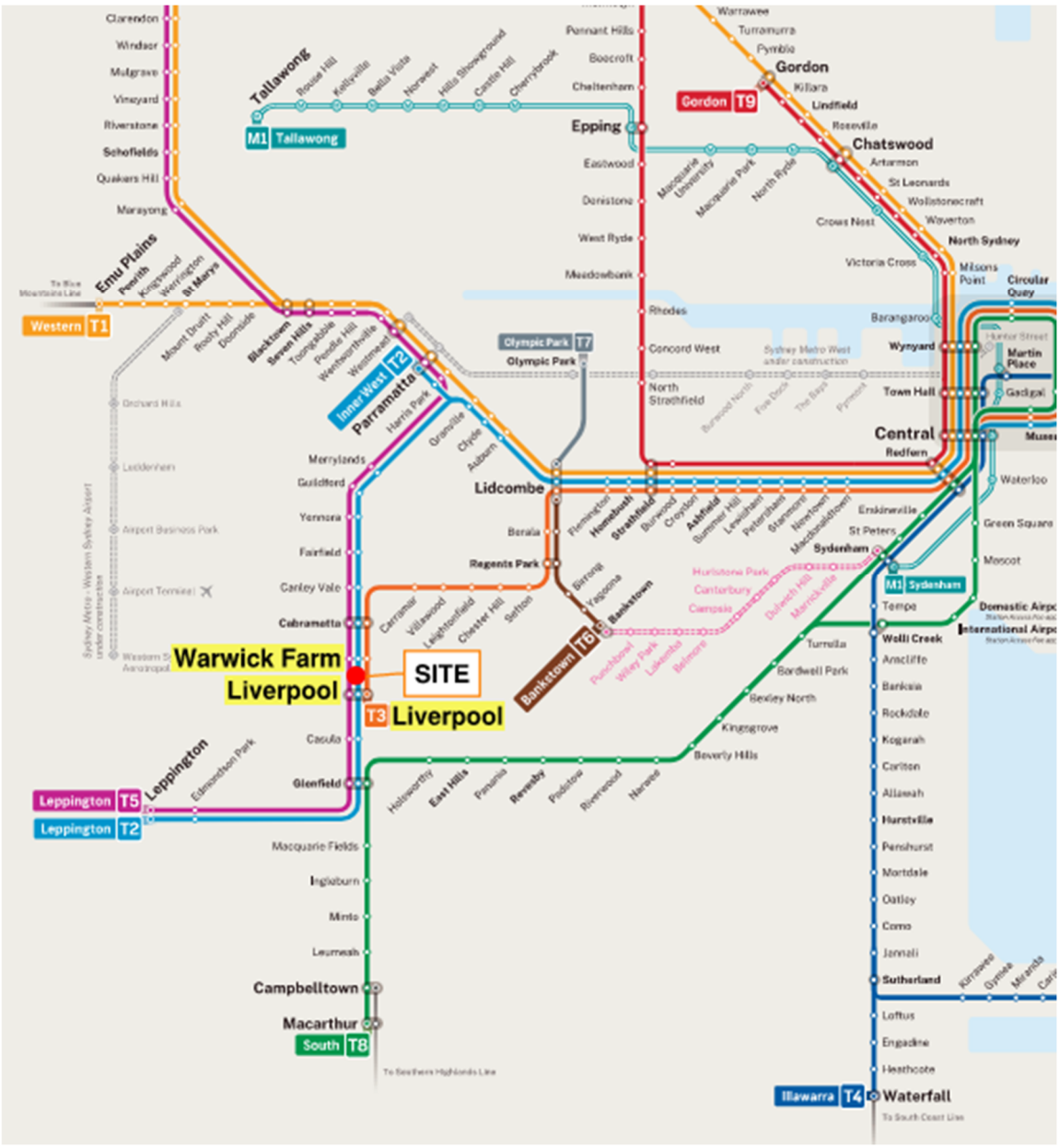


Figure 12 Sydney Trains Network Map
Source: Modified from TfNSW

2.6 Parking Facilities

2.6.1 On-Street Parking

Within the vicinity of the site, there are a number of locations that currently accommodate on-street parking. This includes a combination of unrestricted, restricted ‘P15 min’,’1/4P’,’1P’, and ’2P’ on-street parking provided along Forbes Street, Lachlan Street, Goulburn Street, Drummond Street and Hart Street.

Figure 13 shows the current on-street parking restriction and signage layout within 400 metre radius or 5-min walk to the site.

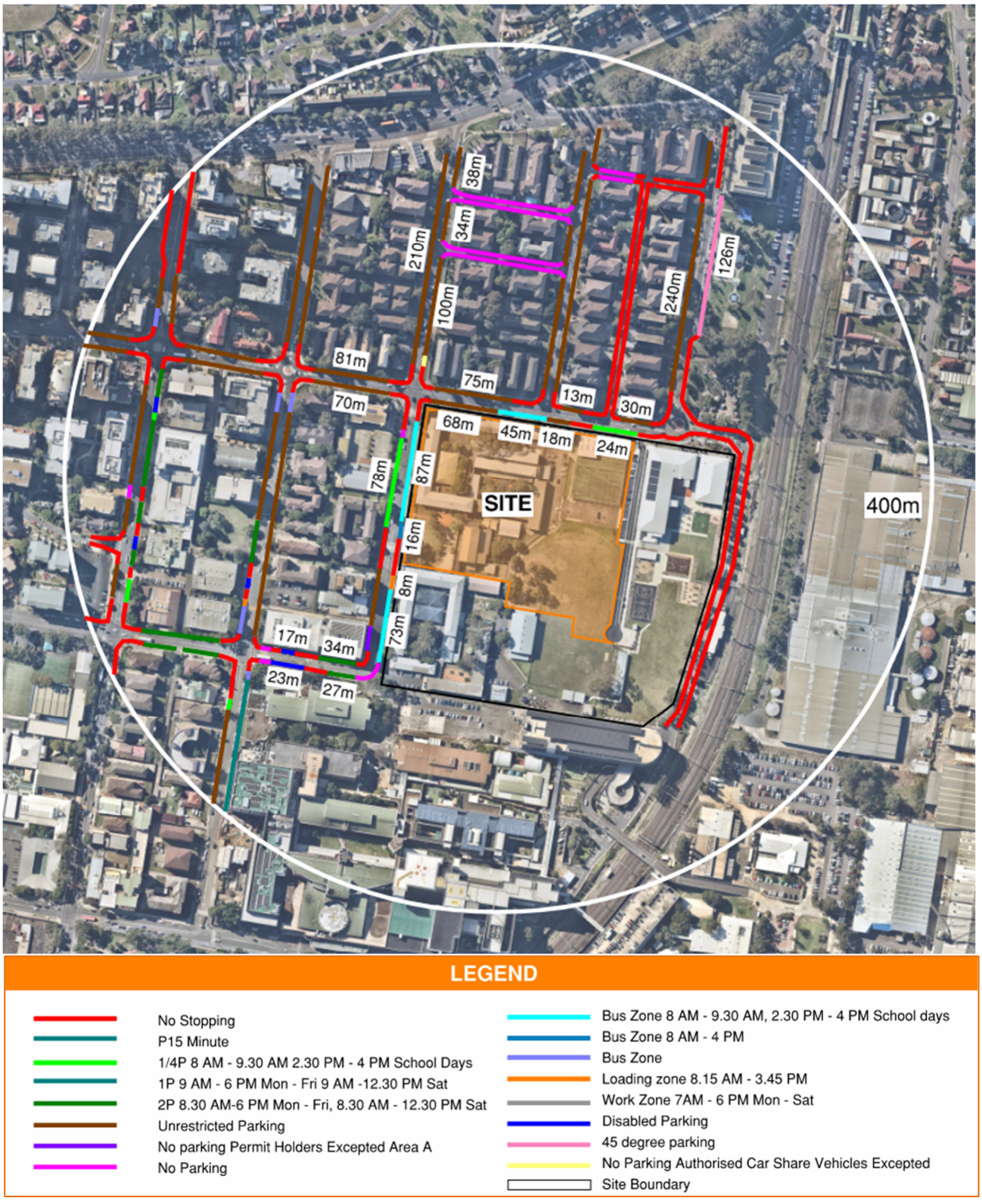


Figure 13: On-street Parking Restrictions
Source: Modified from Nearmap

2.7 Traffic Conditions

2.7.1 Traffic Data Collection

To analyse the existing traffic conditions around the site, intersection movement counts were conducted at various locations in the vicinity of the site, as shown in Figure 14. The scope of the intersection studies was reviewed and agreed with both the Council and TfNSW. The data collection took place on Tuesday, 1 August 2024, between 7:00 – 10:00 am and 2:00 – 6:00 pm. The traffic counts included light vehicles, heavy vehicles, and buses. The intersection movement counts have been conducted at the following intersections:

1. Lachlan Street & Burnside Drive & Hart Street
2. Lachlan Street/ GPS Access
3. Lachlan Street & Drummond Street
4. Lachlan Street & Forbes Street
5. Goulburn Street & Campbell Street

Figure 14: Scope of Traffic Data Collection
Source: Modified from Nearmap

Refer to Section 11 for the detailed methodology and modelling results at each of the above intersections.

2.7.2 Traffic Volumes

The survey data was analysed to determine the average peak hour periods for the surveyed network. The traffic volumes for each hour are presented below in Figure 15 & Figure 16.

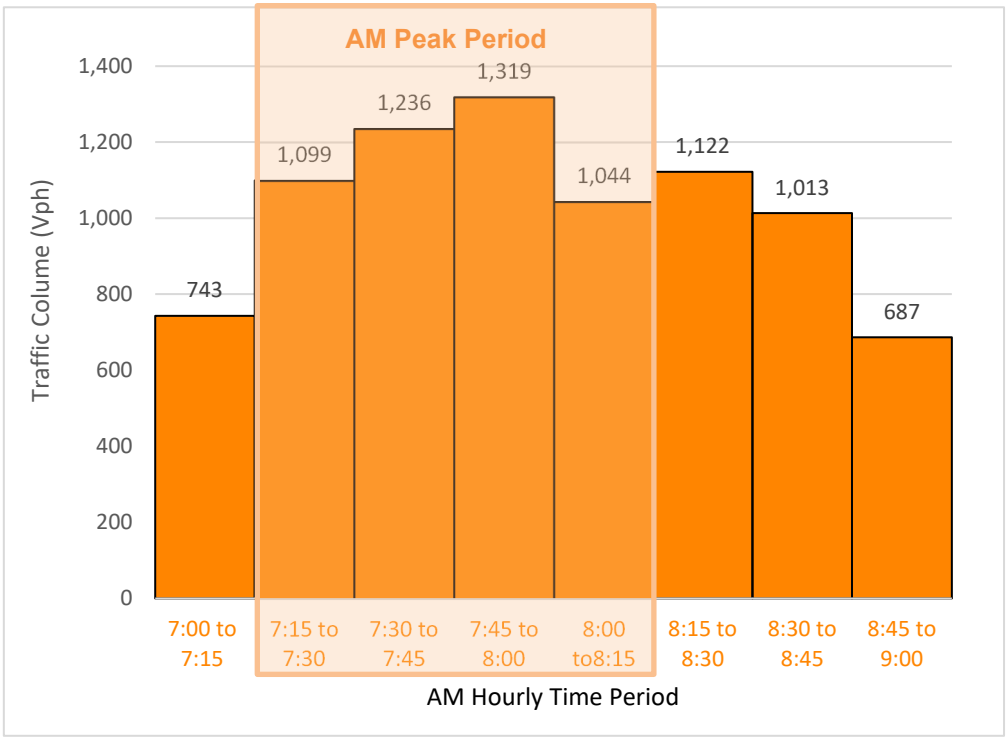


Figure 15: Existing AM Peak Period

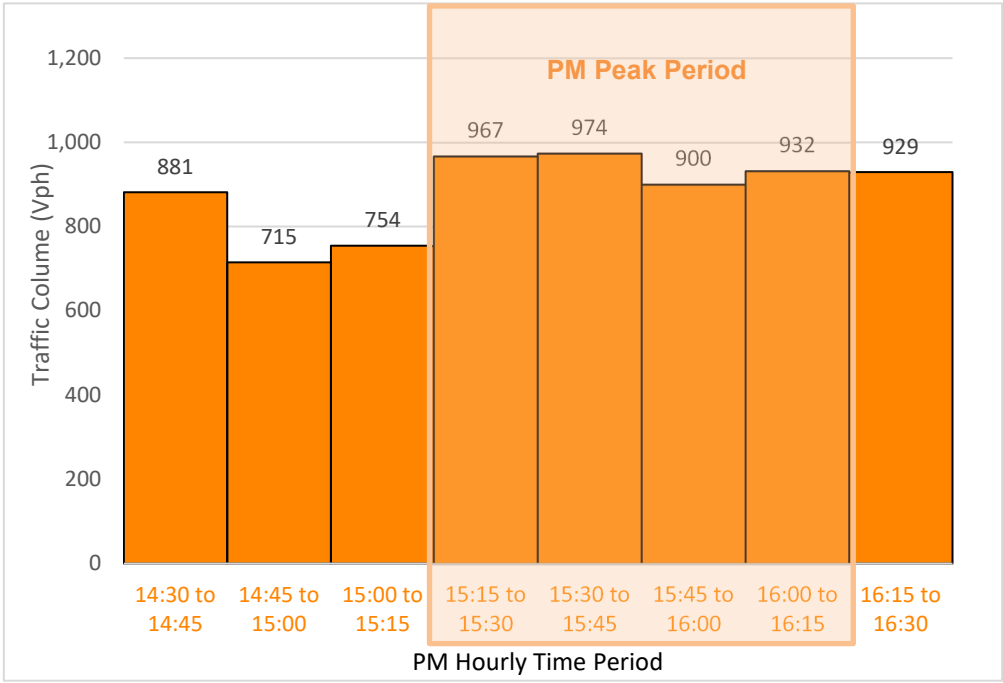


Figure 16:Existing PM Peak Period

As shown in Figure 15 & Figure 16, it is evident the highest overall traffic volumes occur during the morning peak period between 7:30-8:30am. When compared to the morning traffic volumes, the afternoon traffic volumes are approximately 900 vehicles lower, with and average peak hour of 3:15-4:15pm in the afternoon. The peak hours are summarised below in Table 10.

Table 10 AM & PM Peak Hour periods

Peak Period	Peak Hour	Total Vehicles per Hour (vph)
AM	7:30-8:30 am	4,721
PM	3:15-4:15 pm	3,773

The full set of traffic volume data collected at each intersection is attached to Appendix A. Refer to Section 11 for a detailed summary of the traffic volumes adopted in the traffic modelling.

2.8 Travel Mode

2.8.1 Existing School Travel Surveys

In order to understand the typical travel mode patterns to / from the site, travel mode surveys were conducted at both the existing LBHS and LGHS.

The travel mode surveys were distributed online for staff of LBHS and LGHS to complete. For students, the data was collected by teachers in the form of a 'Hands Up Survey', teachers of each class were instructed to ask students to raise their hand and confirm how they travelled to / from school on a typical day, the results were recorded by teachers and uploaded onto the Survey Monkey online. The surveys were completed on 30th September 2024.

In summary, **711 student** responses and **128 staff** responses were obtained. The response rate is 60% for students and 90% for staff. As agreed with SINSW, these results are considered reasonable enough to provide accurate summaries of travel behaviour to / from the school.

Travel behaviours between LBHS and LGHS were reviewed and showed very similar patterns for both staff and students, it was therefore considered reasonable to combine the results and provide a total average for each of the travel modes. The travel mode survey result for students and staff are shown in Table 11.

Table 11 Existing LBHS and LGHS School Mode Share Data

Existing Travel Mode	Students		Staff	
	AM %	PM %	AM %	PM %
Walk	29%	31%	0%	0%
Bicycle / Skateboard / Scooter	1%	1%	0%	0%
Train/Metro	5%	7%	5%	5%
Bus	34%	35%	1%	1%
Car (Passenger)	28%	23%	1%	1%
Car (Driver)	2%	2%	93%	93%
Other	1%	1%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**

As shown above in Table 11, currently, students show good travel habits with 29% walking to school and 31% walking home from school. Public transport uptake is also relatively high with 39% of students travelling to school via public transport and 42% of students travelling home by public transport. Car travel is relatively low for the schools also, with 30% of students travelling to school via car and 25% of students travelling home from school via car.

Typical with most school sites, staff travel mode habits are very car dependant, with 93% of staff travelling to / from school via private vehicle. The survey results showed staff will typically park on-site or on-street depending on car parking availability. The remainder of staff tend to travel to / from school via public transport with a 6% uptake.

The travel mode survey results reflect that the site is within a walkable area of Liverpool City Centre and has well serviced public transport infrastructure, however staff are still very reliant on private vehicles.

2.8.2 Census Journey to Work Data

For comparison, the 2021 Journey to Work (JTW) data[1] was also reviewed. The data provides an estimate of employee travel modes into and out of the local area for the purposes of travel to or from a place of employment. JTW data is defined by Travel Zones and can be assessed as a destination (employees in the zone, who may be from the local area or elsewhere). The site is located within the Liverpool – East zone, within Destination Zones (DZN) 117310010 and Statistical Area Level 2 Zone (SA2).

As shown in Figure 17**,** the site is within the Liverpool Health and Academic Precinct and includes the following notable areas of employment at the time:

- LBHS & LGHS
- Liverpool TAFE Campus
- Liverpool Hospital.

[1] *Bureau of Transport Statistics public dataset derived from 2021 Census Population and Housing*

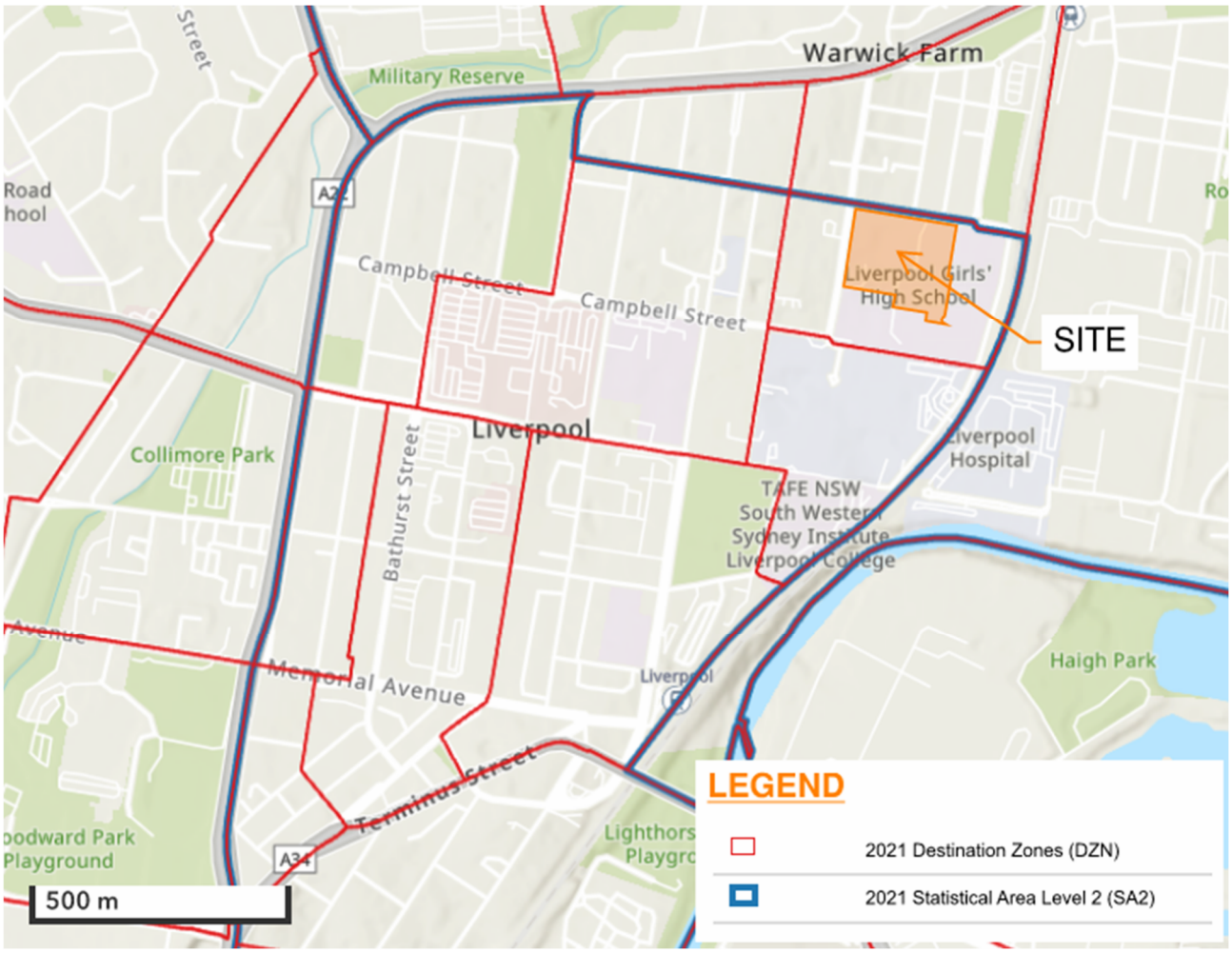


Figure 17: ABS Maps

To complete a comparison between the survey results and the JTW census data, Table 12 provides an analysis and summary of the Census JTW travel mode splits.

Table 12: Census Travel Data Based on Place of Work

Source: ABS

Mode Travel	Percentage Split
Walked Only	6%
Bicycle	0%
Bus	0%
Train	9%
Motorbike/scooter	0%
Taxi	4%
Car, as passenger	0%
Car, as driver	76%
Other modes	5%

The census 2021 travel data detailed in Table 12 identified that 6% of employees typically walk to / from work, and 9% travel by train. Car travel is relatively high with 76% of employees travelling to work via private vehicle. This result shows a relatively high car usage for staff however, this is lower than the current 93% car travel mode recorded for from in the LGHS and LBHS travel mode surveys.

2.9 Other Site Conditions and Observations

Observations of the existing LBHS and LGHS were undertaken during multiple morning and afternoon peak periods across August and November 2024, with the key findings noted as follows:

Pedestrian & Cycling Observation

- There was high pedestrian activity before and after the school bell. The majority of students were observed walking to / from the north-west, via Lachlan Street and from the south via Forbes Street.
- Near misses with pedestrians and vehicles were observed, while pedestrians were crossing at the north side of the Forbes Street and Lachlan Street intersection. There is currently no formal pedestrian crossing in this location.
- Minimal cycling activity was observed from both the LBHS and LGHS.

Public Transport Observation

- Both public and school buses were extensively utilised by students from LBHS and LGHS in both the AM and PM peak period.
- During the morning peak period it was observed that a total of 15 buses serviced the schools, with a maximum of 3 buses utilising the bus zone along Forbes Street at one time. Buses typically arrived 3-5 minutes apart during the AM peak hour.
- During the afternoon peak period, a total of 17 buses were observed servicing the schools, with a maximum of 5 buses utilising the bus zone at one time. 1 bus was observed to be waiting in the bus zone prior to the school bells, however the remainder of buses typically arrived 2-4 minutes apart during the PM peak hour.
- It was also observed a number of students travelled south along Forbes Street and Campbell Street during the AM and PM peak periods. It was assumed these students were walking to Liverpool Train Station or the Liverpool centre.

Kiss and Ride Observation

- It was observed the existing K&R zone along the western side of Forbes Street was 80% occupied by parked cars during the AM and PM peak periods. Parked cars did not leave during the site observation between 8-10am. A similar situation was observed during the PM period. It is understood this may happen as the on-street parking signage is unclear and does not clearly identify the parking area is designated for K&R activities.
- Nevertheless, it was observed the majority of students getting dropped off by car travelled to the site from the north, via Forbes Street, or east / west along Lachlan Street. These students would get dropped off in the bus zone along Forbes Street. It is understood, few vehicles would travel from the south to avoid city centre traffic congestion.
- There is no designated accessible K&R area for either school, accessible drop offs were made at the existing LBHS vehicle access at Forbes Street.

Traffic Observation Within the Vicinity

- During the AM and PM peak periods traffic along Lachlan Street and Forbes Street was busy for approximately 20-30 mins. This occurred for 10-15 minutes before the school bell rung and 10-15 minutes after the school bell rung. Traffic appeared to be well managed at all intersections with no excessive queues or impacts.
- The Forbes Street / Lachlan Street intersection arrangement is unsafe with many near misses or vehicle conflicts with vehicles turning right. Pedestrian refuges do not provide much protection and appear to be non-compliant.
- Due to the staggering of bell times, it was observed, the GPS peak traffic did not overlap with the LGHS or LBHS peak traffic in either of the AM or PM peak periods.
- No adverse traffic generation was observed during the hospital shift change over at 3pm. From observations it did not appear that the hospital shift change over and school afternoon bell times impacted one another.

Section 3 Proposed Works

3.1 Description of Works

The new LBGHS has an anticipated opening year of 2028, facilitating existing student demands in the interim, with an ultimate student capacity of 2,000 students. The proposal involves the following works:

[redacted]

- Construction and operation of a six-storey school building, comprising:
  - General learning spaces (GLS)
  - Administration facilities
  - Staff facilities
  - A library
  - School hall and gymnasium building
- Delivery of a new central courtyard, a sports field and 3 sports courts
- Construction of 112 staff car parking spaces, on-site waste storage and loading area to accommodate a 10.5m waste truck
- Tree removal and associated landscaping
- Associated off-site infrastructure works to support the school, including (but not limited to), pedestrian crossing upgrades, footpath widening and kiss and drop relocation.

The following operational details are also summarised below:

- Construction is planned to commence mid 2025
- Stage 1 involves the relocation of LBHS to the LBHS temporary school facility, this stage is subject to a separate planning application.
- Opening year, day 1 term 1, 2028 – expected enrolment of 1,200 students and 166 staff.
- Full capacity, expected by 2041 – 2,000 students and 214 staff.

The overall proposed site plan is illustrated in Figure 18.

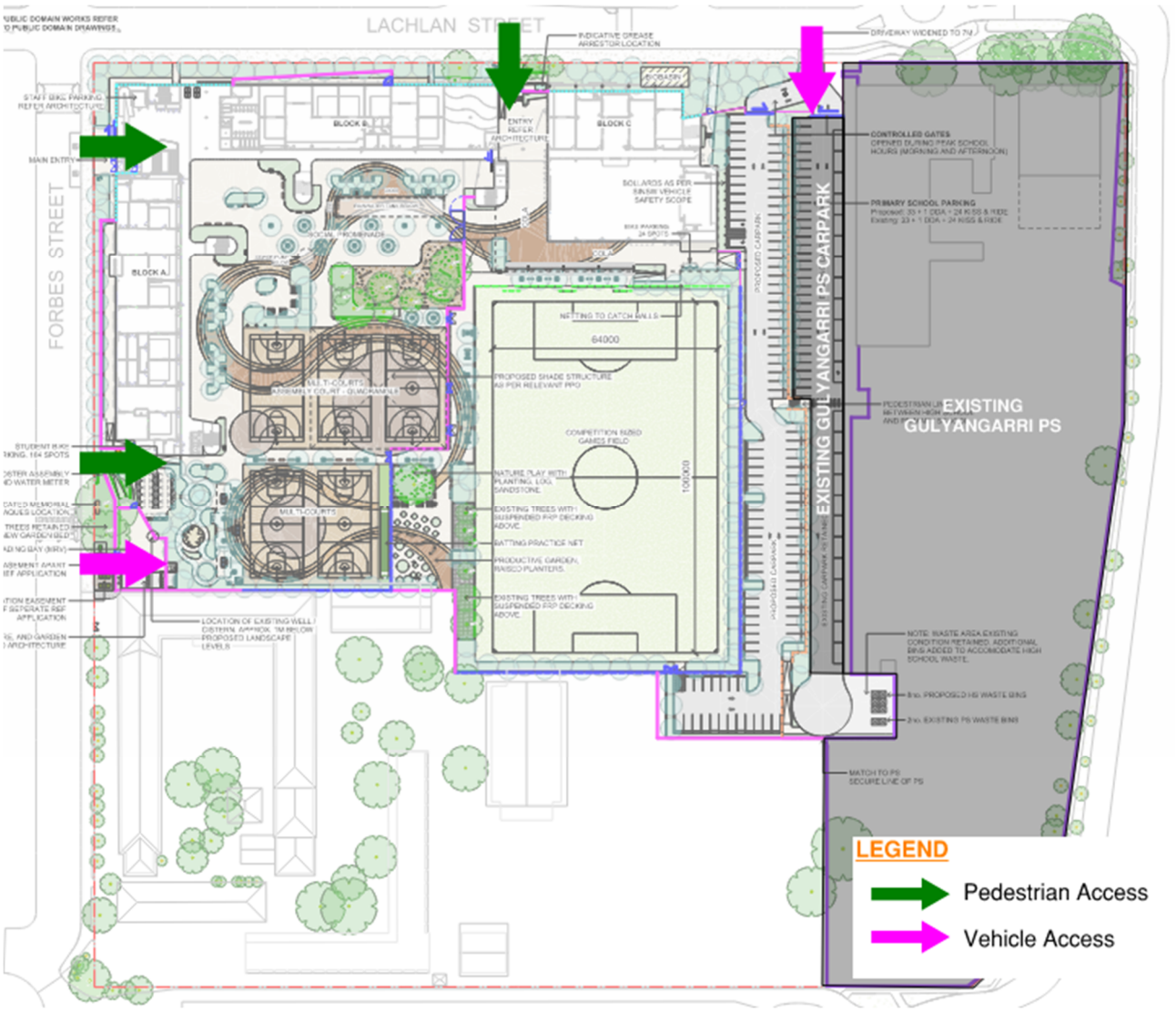


Figure 18: Proposed Site Plan
Source: Modified from NBRS

3.2 On-site Works

In relation to traffic and parking the proposed school will provide the following on-site provisions:

- 3 pedestrian access points, via Forbes Street and Lachlan Street
- 200 student bicycle spaces & 22 staff bicycle spaces
- End of trip facilities for staff, including 6 shower / change rooms and 27 lockers
- 2 service vehicle areas accommodating a 10.5 metre waste truck in the existing GPS waste area and an 8.8m MRV for woodworks and deliveries via Forbes Street
- 112 staff car parking spaces for LBGHS, including 2 accessible car parking spaces. The proposed car park is accessed via the existing GPS vehicle access, however both the GPS and LBGHS car parks will be completely separated.

3.3 Off-site Works

An overall plan showing the proposed off-site works is illustrated in Figure 19 and detailed in Table 13.

Table 13: Proposed Off-Site Works

Item	Location	Description
Footpath Upgrade (F1)	Lachlan St (North) between Forbes St & Goulburn St	Footpath widening from 1.2m to 2.5m width for 75m. The footpath upgrade is to accommodate high pedestrian activity.
Pedestrian Refuge Upgrade (P1, P2)	Forbes St / Lachlan St (eastern and western leg)	Upgrade existing 2 pedestrian refuge to a compliant pedestrian refuge[1]
Pedestrian Refuge (P3)	Forbes St / Lachlan St (northern leg)	New pedestrian refuge at the northern leg of the intersection[1]
Wombat Crossing Relocation (P4)	Forbes St	Relocation of the existing raised crossing at the middle of Forbes Street to accommodate new vehicle access
K&R & Loading Bay Signage (S1)	Lachlan St (South)	Proposed new 68m K&R area with existing 30m K&R area to assist with vehicle movements. Total to 98m K&R are or equivalent to 15 K&R spaces The first 12m of the K&R area is also proposed to be designated at a loading bay outside school bell times – upgrade to signage only
Parking Signage (S2)	Forbes St (West)	Change signage at existing 78m K&R area to on-street parking
Accessible K&R Signage (S3)	Forbes St (East)	Provision of 2 accessible K&R spaces (~15.6m length / 2 DDA Spaces)
Priority Reversal (S4)	Forbes St / Lachlan St	A reversal of priority at the Lachlan Street / Forbes Street intersection[2] Refer to Section 1.1 for details
Bus Zone (S5)	Forbes St (East)	Reconfiguration of the existing 103-metre bus zone to 73 metres *Note: the bus zone south of the mid-block ped crossing is retained*
Loading Bay Signage (S6)	Lachlan St (South)	Provision of an on-street loading bay for an 8.8m MRV

[1] Theses upgrade works are already captured in Condition D7A of the GPS SSD-10391 approval, and are required prior to the operation of Stage 2, however SINSW are committed to upgrading these pedestrian refuges and implementing the traffic restrictions prior to operation of LBGHS.

[2] Condition D7A (b) of the GPS SSD-10391 states the reversal of the existing priority at the Lachlan Street / Forbes Street intersection to enhance its performance is required prior to the operation of Stage 2. If not already completed, this is intended to be implemented by LBGHS 2 years from LBGHS operation.

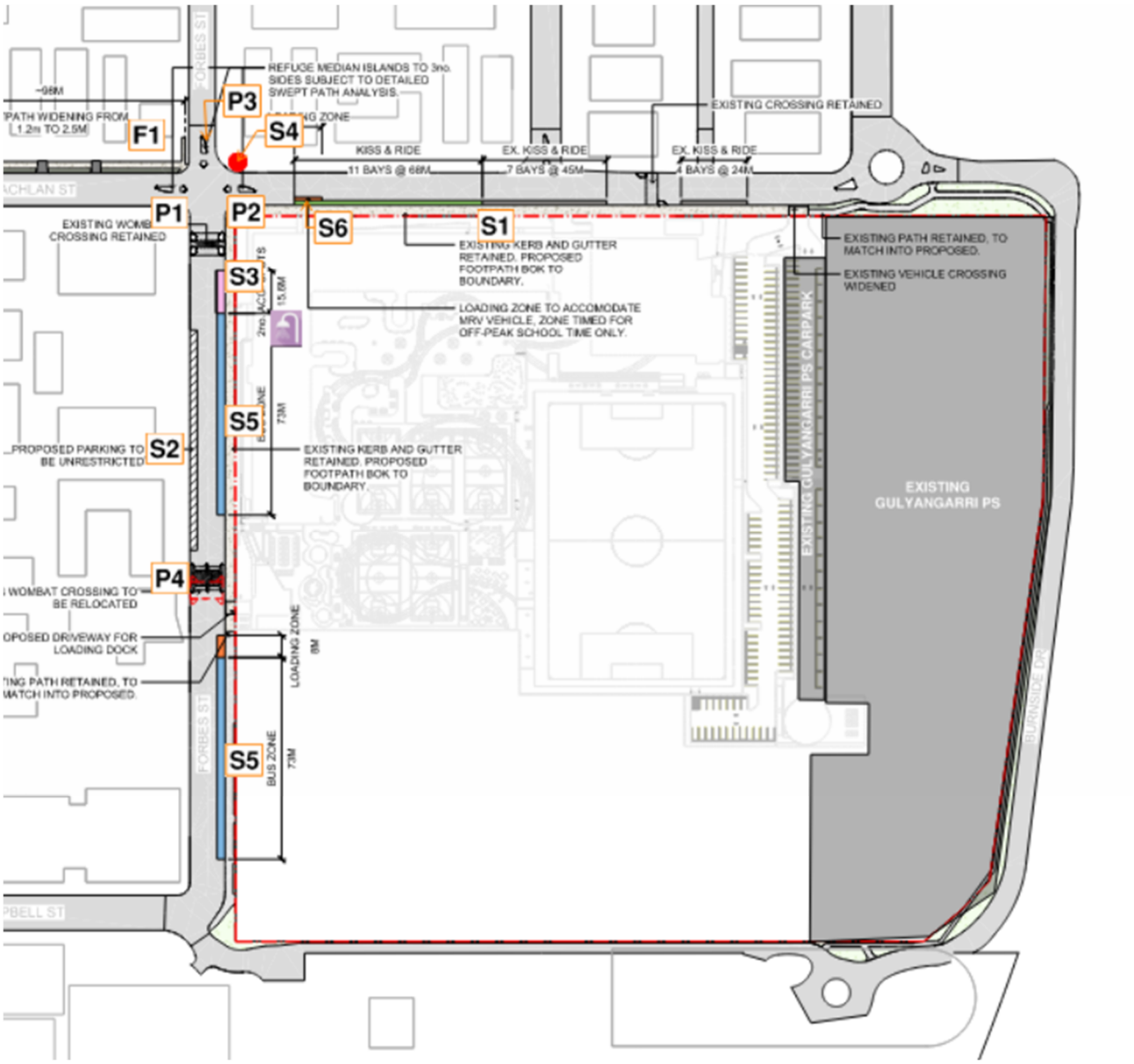


Figure 19: Proposed Off-Site Works
Source: Modified from Nearmap

3.3.1 Forbes Street Cross-Section

As mentioned in the section above, the proposal involves the relocation of the existing 78 metre K&R zone on the western side of Forbes Street to the southern side of Lachlan Street. As a result, the current K&R zone will be converted to on-street parking. In addition, the proposal includes a new accessible K&R zone on the eastern side of Forbes Street. The standard K&R zone and on-street parking will only require signage changes which are and illustrated in Figure 20.

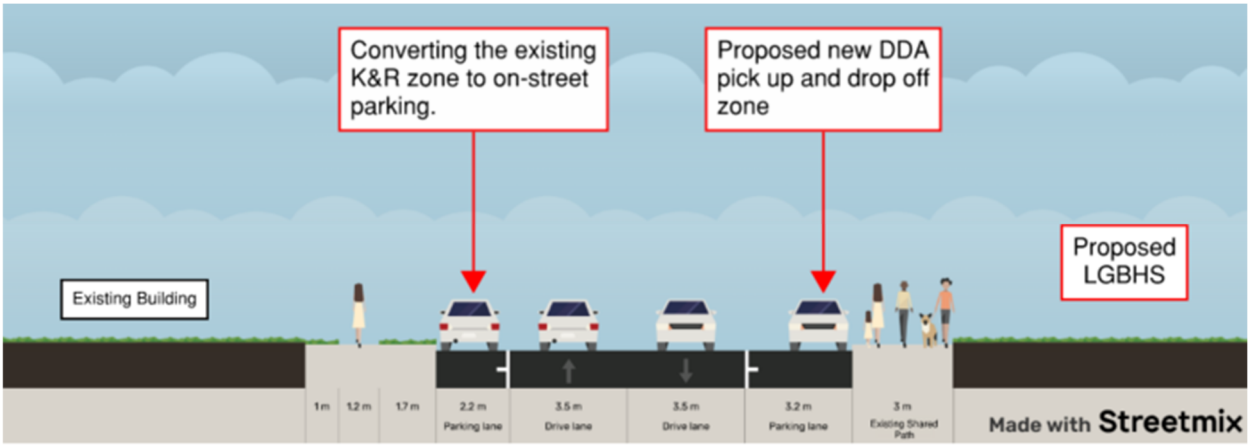


Figure 20: Proposed Cross Section on Forbes Street
Source: TTW Note: Figure is for diagrammatic purposes only

3.3.2 Lachlan Street Cross-Section

As shown in Figure 19, the proposed K&R zone will be located on the southern side of Lachlan Street for approximately 68 metres. This change will involve the relocation of the existing unrestricted on-street parking to the western side of Forbes Street. In addition, it is proposed the first 12m of the K&R zone will be sign posted as a loading bay outside K&R activity hours. The loading bay is proposed to assist couriers with convenient access to the main site access.

The proposed works will require signage changes only and the cross-section is shown in Figure 21. No other changes are proposed to the remaining sections of Lachlan Street.

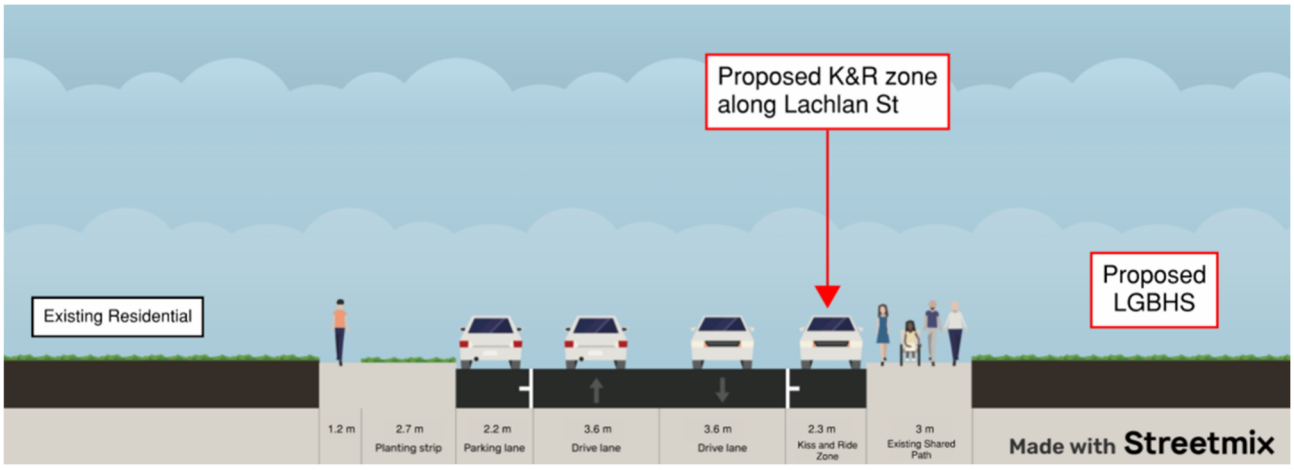


Figure 21: Proposed Cross-Section at Kiss & Ride Zones on Lachlan Street
Source: TTW Note: Figure is for diagrammatic purposes only

Section 4 Travel Demands

4.1 Transport Hierarchy

The transport strategy for the project is designed as a sustainable transport strategy, prioritising non-vehicle modes such as active transport (i.e. walking, cycling) and public transport and discouraging private vehicle travel (including kiss & ride and car parking). This hierarchy is indicatively illustrated in Figure 22.

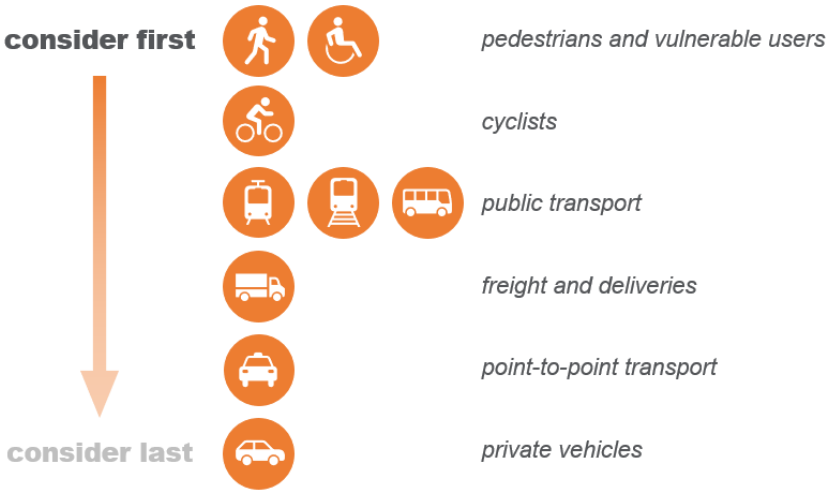


Figure 22: Sustainable Transport Hierarchy

This strategy is consistent with NSW state government policy, specifically the Road User Space Allocation Policy. This strategy is applied across all current SINSW projects and has been presented to Council and TfNSW through the Transport Working Group consultation stream.

4.2 Student Location Analysis

Typically, DoE will provide student location data within a 5km radius of the site to confirm where students currently live within the catchment. This allows the student location analysis to be completed and determine where students live within the catchment, and therefore determine suitable travel modes to / from school.

According to data from DoE, a total of 1,430 students are eligible to enrol in the LBHS and LGHS. By incorporating the existing road network within the school catchment and the student location from SINSW, the analysis was able to estimate student's distance to / from the school, which can determine the relevant travel modes to / from the school.

Figure 23 shows the actual walking distances (colour coded) and notional (straight line) distances from the site within the school catchment. Table 14 has then extracted the student location data to confirm existing student locations within the school catchment.

Figure 23: Walking and Radial Distances

Table 14: Students Location Distribution within the School Catchment

Distance	Actual Walking Distance		Notional Distance	
	Students	%	Students	%
0 – 400m (5min walk)	127	9%	215	15%
400 – 800m (10min walk)	234	16%	229	16%
800 – 1200m (15min walk)	180	13%	251	18%
1200 - 2000m	614	43%	671	47%
2000 – 2900m	265	18%	64	4%
>2900m	10	1%	0	0%
Total	**1,430**	**100%**	**1,430**	**100%**

The key findings derived from this walking distance analysis include the following:

- Approximately 38% of students currently live within a 5 minute to 15-minute walk of the site.
- Approximately 62% of students are located outside a 15-minute walk of the site, this is predominantly due to the majority of residential areas being located on the western and the northern side of Hume Highway.
- 4% of students (more than 2km straight line distance) or 1% of students (more than 2.9km actual walking distance) are eligible for free public transport in accordance with the School Student Transport Scheme (SSTS).

- It is therefore anticipated, students living in the western parts of the catchment which are located more than 2900m from the site will be likely to travel via bus or car.

When compared to the existing travel mode survey results detailed in Section 2.8, the analysis shows 38% of students live within a 15-minute walk of the site and the survey results showed typically between 29%-31% of students walk. It is therefore assumed a large portion of students living within 15 minutes of the site currently walk.

The analysis also showed up to 4% (4% notional & 1% actual walking distance) of students, are currently eligible for free student travel while the survey results showed between 39%-42% of students utilised public transport. This shows a large portion of students pay to travel to / from school via public transport.

4.3 Travel Scenarios

As detailed in Section 1.3, the opening year student enrolment is intended to be very similar to existing enrolments of approximately 1,200 students and 166 staff. The proposed school will have an ultimate maximum capacity of 2,000 students and 214 staff. SINSW enrolment projections show maximum capacity will be reached gradually as the wider Liverpool area develops. The projected travel mode splits have been presented for 3 different scenarios including **baseline, moderate** and **reach** mode splits, described in the following paragraphs.

The basis for the transport assessment presented in the remainder of this document will adopt a conservative approach that assesses the school within opening year and full capacity and considers either the moderate or reach mode share splits, whichever results in the largest travel demand (unless otherwise indicated).

4.3.1 Baseline Scenario

The baseline scenario has been calculated through an assessment of existing travel data collected at the existing LBHS and LGHS (see section 2.8.1). This scenario is an average of the existing student and staff travel behaviours at the existing schools.

This scenario provides a reference point for developing the forecast travel mode splits for the proposed LBGHS redevelopment. However, it is expected that this project will be able to achieve more ambitious travel mode splits as described in the following section, with less focus on car travel and a greater uptake in active and public transport.

4.3.2 Moderate Scenario

The moderate target scenario represents the expected travel demands developed based on a review of the existing travel survey of both LBHS and LGHS, plus anticipated travel habits based on the school catchment area and the projects transport provision. This scenario seeks to forecast the travel habits of students in the opening year of the LBGHS.

Refer to Section 2.8.1 which discusses existing travel habits from the survey. A sample of existing travel habits includes:

- 29% and 31% walking mode split in the morning and afternoon
- 1% bicycle usage in the morning and afternoon
- 34% and 35% bus usage in the morning and afternoon
- 30% and 25% private vehicle usage in the morning and afternoon

Site-specific considerations based on the student location analysis are detailed in Section 4.2 for the transport provisions at the school and catchment area include:

- Based on our analysis it is anticipated approximately 38% of students will live within 0-1.2km of the school, which equates to a 15-minute walk.
- Based on our analysis it is anticipated approximately 43% of students will live within 1.2km-2km of the school, which equates to a 10-minute cycle.
- Pedestrian and cyclist infrastructure near the school site provides good connections within the local road network and to nearby residential areas. This includes shared paths and footpaths along a vast majority of roads.

The proposed on-site transport facilities detailed in Section 3 include:

- Upgrades to 2 pedestrian refuges and relocation of 1 wombat crossing. This will improve and promote safe active transport travel for both students and staff to the school.
- Proposed on-site bicycle parking for students and staff as well as end-of-trip provision for staff. To encourage cycling to and from the school.
- Proposed re-routing of the 819 bus route to service the site. This will Improve bus connectivity for approximately 200 students living within the Orange Grove area.
- Other relevant policies and considerations include:
  - The school is an existing campus that currently already has extremely good uptake of walking and public transport usage. The proposed re-development presents an opportunity to improve the current travel habits through infrastructure upgrades and implementation of new school policies.
  - Local staff recruitment considerations are currently under review by DoE

4.3.3 Reach Target Scenario

Importantly, the project is seeking to use the opportunities presented by the redevelopment of the site to improve existing travel behaviour. In transport planning terminology, this is the change from a 'predict and provide' methodology based on existing behaviours to a 'decide and provide' methodology to achieve a preferred future and vision. In order to avoid generating high levels of additional vehicular traffic through induced demand, transport provisions and capacity are specifically targeted and are supported with infrastructure and services across the full spectrum of transport options.

This strategic vision is also consistent with the recently released Future Transport Strategy, which in relation to schools, states that a specific priority action is to be implemented (which are "actions to be implemented as a priority, with the view to delivery outcomes in 1-5 years"):

> *"Partner with the Department of Education and key stakeholders to improve safe walking, cycling and public transport access to schools."*[i]

This priority action indicates that higher levels of walking, cycling, and public transport, and conversely lower levels of private vehicle travel, are of high importance to the success of local neighbourhoods and that existing travel behaviours are expected to change as new facilities or services are implemented.

On these grounds, the target travel mode splits presented in the following tables are considered realistic and feasible. The target travel demands outlined in Section 4.3.4 and 4.3.5 have been developed in light of this, with a greater emphasis on minimising private vehicle usage for both students and staff as much as possible and improving active and public transport usage.

It is acknowledged that these target mode splits are ambitious and depart reasonably significantly from some of the existing travel behaviours. However, as mentioned, the mode splits are considered achievable due to the considerations listed above, and the opportunity of the relocation of the school to improve existing travel habits. Further to this, it is important to note that the ultimate reach targets are not expected to be achieved in the opening year of the school, but rather reached over time as the school grows.

4.3.4 Proposed Travel Mode Splits

The proposed moderate and reach target travel mode splits for both students and staff are shown below in Table 15.

Table 15: Mode Share Scenarios

Travel mode	Students			Staff		
	Baseline[1]	Moderate	Reach	Baseline[1]	Moderate	Reach
	%	%	%	%	%	%
Walk	30%	32%	34%	0%	5%	6%
Bicycle	1%	5%	8%	0%	3%	5%
Bus	35%	36%	38%	1%	7%	10%
Train	6%	6%	6%	5%	10%	14%
Car (passenger)	25%	21%	14%	1%	10%	15%
Car (driver)	3%	0%	0%	93%	65%	50%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

[1]Baseline results are an average of the existing AM and PM travel mode survey results presented in Section 2.8.1

As shown in Table 15, the project aims to reduce private vehicle usage for both staff and students by reducing to 65% car usage for staff and 21% car usage for students in opening year and 50% car usage for staff and 14% car usage for students when the school has reached full capacity. As a result, the project is intended to increase the number of students and staff that cycle or walk to school or use public transport to the school.

4.3.5 Proposed Travel Mode Volume

As the project involves the redevelopment of the existing LBHS and LGHS, it is expected that the student and staff numbers in the opening year will be similar to the existing enrolments. Based on SINSW enrolment forecasts the school will reach full capacity by 2041. As a result, travel modes have been displayed for opening year and 2041. The proposed travel mode volumes are shown in Table 16.

Table 16: Student Travel Demand Projection

Travel Mode	Opening Year			Full Capacity		
	Baseline	Moderate	Reach	Baseline	Moderate	Reach
Walk	360	384	408	600	640	680
Bicycle	12	60	96	20	100	160
Bus	420	432	456	700	720	760
Train	72	72	72	120	120	120
Car (passenger)	300	252	168	500	420	280
Car (driver)	36	0	0	60	0	0
Total	**1,200**	**1,200**	**1,200**	**2,000**	**2,000**	**2,000**

The proposed travel mode volumes for staff in opening year and maximum capacity are also detailed below in Table 17.

Table 17: Staff Travel Demand Projection

Travel Mode	Opening Year			Full Capacity		
	Baseline	Moderate	Reach	Baseline	Moderate	Reach
Walk	0	8	10	0	11	13
Bicycle	0	5	8	0	6	11
Bus	2	12	17	2	15	21
Train	8	17	23	11	21	30
Car (passenger)	2	17	25	2	21	32
Car (driver)	154	108	83	199	139	107
Total	**166**	**166**	**166**	**214**	**214**	**214**

The proposed demand for each travel mode has been further analysed and discussed in Section 5 to Section 10.

Section 5 Pedestrians

5.1 Demands

Future pedestrian volumes have been calculated in the proposed travel mode splits above in Section 4.3, and are summarised in Table 18 for reference.

Table 18: Summary of Pedestrian Travel Demands

Pedestrians	Baseline			Moderate			Reach		
	Mode Split	Volume		Mode Split	Volume		Mode Split	Volume	
		OY	Max		OY	Max		OY	Max
Students	30%	360	600	32%	384	640	34%	408	**680**
Staff	0%	0	0	5%	8	11	6%	11	**13**

Notes: OY: Opening Year
Max: Maximum capacity

The assessment projected that largest travel demand occurs as the most conservative scenario. As **underlined** in Table 18, this scenario would be the students and staff numbers with the reach mode split applied to the maximum capacity. The analysis of the projected demand is detailed in Section 5.2 and supported with the proposed facilities shown in Section 5.3.

5.2 Analysis

5.2.1 Estimate Student Pedestrian Volume

To understand the most utilised paths of travel to the school, a shortest trip assessment was completed based on the student location analysis data. The shortest walking path and the walking distribution are shown in Figure 24.

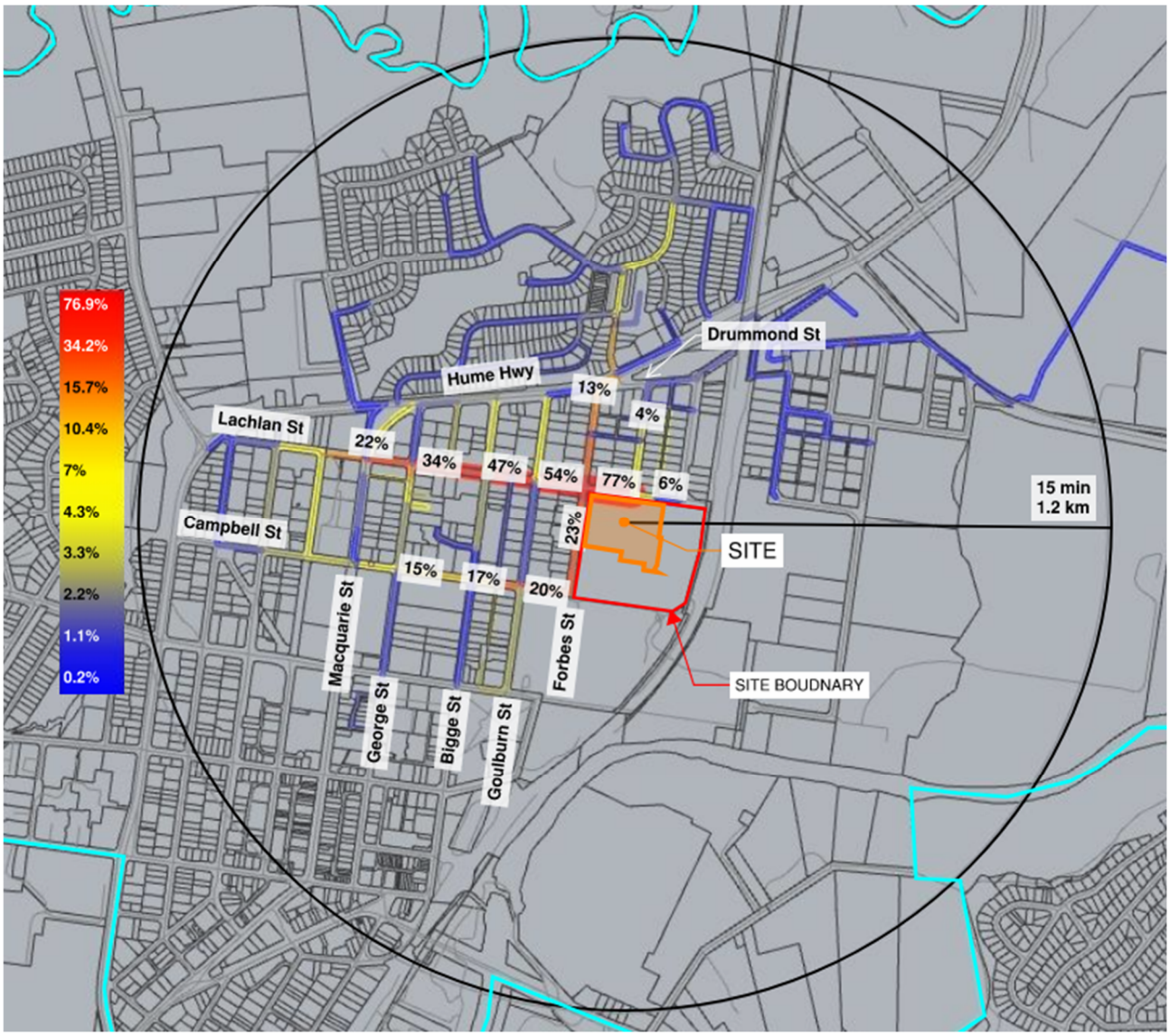


Figure 24: Pedestrian Inbound Trip Distribution

As shown below in Figure 24, a total of 54% of students will utilise Lachlan Street as the main pathway to the school. These pedestrians are mainly travel from the west and north of the precinct. It is also shown that 20% of students will utilise Campbell Street as their access to the school. The analysis showed that 13% travel to / from the north, 54% travel to / from the west of the precinct, 20% travel to / from the south and southwest of the precinct, and 6% travel to / from the east of the precinct.

The above percentage splits are then applied to the number of students that live within a 15-minute walk of the site. As per the student location data, it was estimated that 760 students of the maximum 2,000 students will live within a 15-minute walk of the school.

Figure 25 below applied the above percentages to the actual number of students who have the potential to walk to school.

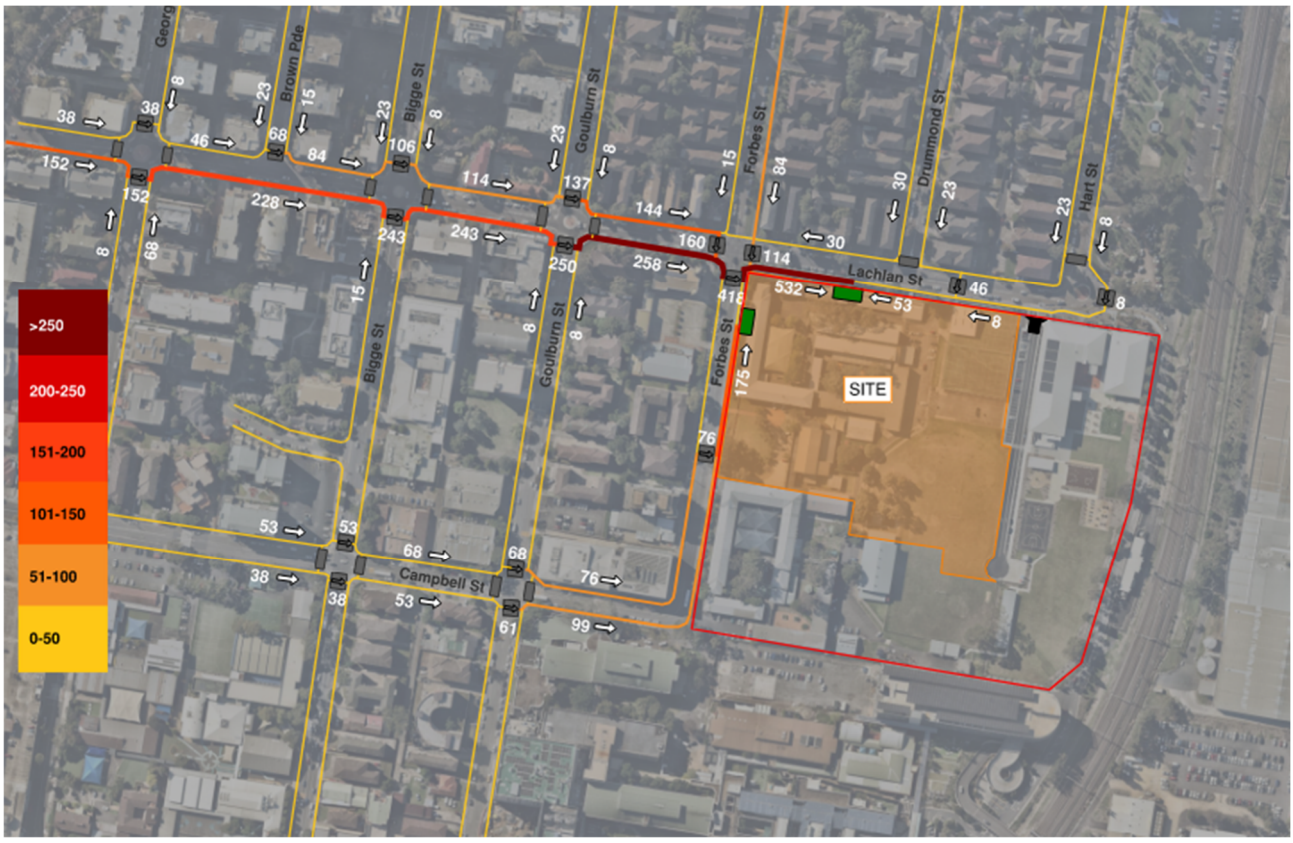


Figure 25: Footpath Utilisation Near the Vicinity of The Proposed School

Based on the student walking analysis above, the maximum student reach trip generation is summarised below:

- Approximately a total of 585 students have the ability to utilise the southern side of Lachlan Street to walk to / from school.
- It is estimated that a maximum of 144 students will utilise the northern side of Lachlan Street before crossing through the existing pedestrian facility at Lachlan St / Forbes St intersection.
- It is estimated that 160 students have the ability to cross at the western leg of Lachlan Street and Forbes Street intersection, this is primarily students that walk from/to the north and north-west.
- Similarly, approximately 114 students have the ability to cross at the existing pedestrian facility at the eastern leg of the Lachlan Street / Forbes Street intersection.
- The southern pedestrian crossing will be the most utilised crossing as it is expected that 418 students can utilise this pedestrian facility.
- Although Lachlan Street will be the main path to school, approximately 175 students will walk via Forbes Street to / from the school

Note, the above is a conservative assessment and has only considered walking travel mode habits with students located 15 minutes (~1.2 km) from the proposed school, it does not account for students that travel to/from school by other travel modes, i.e. public bus, private vehicle and utilise a crossing to access the site. The assessment also does not include students from the existing GPS.

5.2.2 Existing Pedestrian Facilities

As detailed in Section 2.3, there is an abundance of existing pedestrian infrastructure surrounding the site. Below shows the existing pedestrian infrastructure located at the Lachlan Street / Forbes Street intersection.

Figure 26: Existing Pedestrian Facilities at Lachlan St / Forbes St Intersection
Source; Modified from Nearmap

As shown above, the intersection currently provides a wombat crossing on the southern leg of Forbes Street and no pedestrian crossing infrastructure on the northern leg. The eastern and western leg of Lachlan Street provide 2 pedestrian refuges, based on our on-site observations it was confirmed these existing pedestrian refuges are not compliant with the most recent AS 1742.10. Based on the forecast pedestrian volume, it is expected that there will be an increase in utilisation at each leg of this intersection.

5.3 Proposal

The scope of proposed pedestrian provisions including site access points, footpath works and crossing facilities are illustrated in Figure 27.

Figure 27: Proposed Pedestrian Facilities
Source: Modified from Nearmap

5.3.1 Pedestrian Site Access

The proposed works will have its main pedestrian access points on the northern site frontage on Lachlan Street. The proposal also includes 2 secondary access points located at the western side of the school at Forbes Street.

5.3.2 Footpaths

As shown in Figure 27, the existing footpath along the northern side of Lachlan Street between Forbes Street and Goulburn Street will be widened to 2.5 metres footpath. This will accommodate the increased pedestrian activity to/from the proposed LBGHS based on the forecast pedestrian analysis shown in Section 5.2.1

5.3.3 Crossings

As shown in Figure 27, the proposal includes 2 upgraded pedestrian refuges along the western and eastern legs of the Lachlan St/Forbes St intersection, 1 new pedestrian refuge at the northern leg of the Lachlan Street / Forbes Street intersection and 1 along Forbes Street. The following shows the details of the upgrades

Pedestrian Refuge (P1, P2)

As shown in Figure 26, the existing pedestrian refuge is not compliant with AS1742.10. These crossings will be updated to a compliant pedestrian refuge prior to the operation of LBGHS which involves the following:

- Pedestrian refuge median island will be designed in accordance with AS1742.10 with the following dimensions will be 2 to 3 metre width x 3 metre spacing between islands x 3.5 metre long islands. The actual width will be subject to swept path assessment during detailed design.
- No stopping distances are as follows
  - 20 metres on approach to the pedestrian refuge

Pedestrian Refuge (P3)

As detailed in the site observation section, the current northern leg of the Forbes Street / Lachlan Street intersection leg, does not provide any safe pedestrian crossing. The provision of a pedestrian refuge at this location will be provided prior to the operation of LBGHS which involves the following:

- Pedestrian refuge median island will be designed in accordance with AS1742.10 with the following dimensions will be 3 metre width x 3 metre spacing between islands x 3.5 metre long islands
- No stopping distances are as follows
  - 20 metres on approach to the pedestrian refuge

Wombat Crossing Relocation (P4)

As shown in Figure 27, the existing crossing in the middle of Forbes Street will be relocated further closer to the LBGHS school entry. The relocation is to assist students who travel from the south of Forbes Street and to allow delivery entry to entry & exit the loading zone.

Section 6 Cyclists

6.1 Demands

Future cyclist volumes have been calculated in the proposed travel mode splits within Section 4.3, and are summarised in Table 19 for reference.

Table 19: Summary of Cyclist Travel Demands

Cyclists	Baseline			Moderate			Reach		
	Mode Split	Volume		Mode Split	Volume		Mode Split	Volume	
		OY	Max		OY	Max		OY	Max
Students	1%	12	20	5%	60	100	8%	96	**160**
Staff	0%	0	0	3%	5	6	5%	8	**11**

The assessment projected that largest travel demand occurs as the most conservative scenario. As **underlined** in Table 19, this scenario would be the students and staff numbers with reach mode split applied. The analysis of the projected demand is detailed in Section 6.2 and supported with the proposed facilities shown in Section 6.3.

6.2 Analysis

6.2.1 Bicycle Facilities

Reference has also been made to LDCP Part 4 to confirm the required bicycle parking provisions. Section 4.4.2 stipulates that bicycle requirements within the Liverpool City Centre should be extracted from LDCP 2008.

As such, reference was made to Table 13 within Section 20.3 of LDCP 2008 to confirm the number of bicycle parking spaces required. Table 20 below details the LDCP 2008 requirements and the proposed provision in response.

Table 20: Bicycle Requirement & Provision based on the LDCP 2008

Educational Facilities	Max Capacity	DCP Bicycle Rates	DCP Requirements	Parking Provision
Students	2,000	1 per 10 students	200	200
Staff	214	1 per 10 staff	22	22
Total			**222**	**222**

As shown above in Table 20, the LDCP 2008 requires approximately 200 student bicycle parking spaces and 22 staff bicycle parking spaces. The proposed site will provide a total of 222 bicycle parking spaces, comprising 200 student bicycle spaces and 22 staff bicycle spaces. The proposed provision meets the minimum requirements of the LDCP 2008 and is therefore considered acceptable.

In addition, the proposed mode share targets provide a reach target of 8% of students and 5% of staff cycling to / from school. This equates to 160 students and 11 staff members. The proposed provision of 200 students and 22 staff bicycle spaces is therefore considered acceptable to meet the proposed travel mode reach targets.

All bicycle spaces have been designed in accordance with AS 2890.3 and are provided as security level B.

6.2.2 End of Trip Facilities

From review of the LDCP Part 4 there are no specific requirements for end of trip facilities (EOTF) for educational establishments, reference was therefore made to the LDCP 2008 to adopt EOTF requirements.

Section 20.3 details specific EOTF for new developments. Table 21 below details the LDCP 2008 requirements and the proposed provision in response.

Table 21: Staff EOTF Facilities Requirement Based on The Liverpool DCP 2008

	Bicycle Provision	DCP EOTF Rates	DCP Requirements	EOTF Provision
Staff Bicycle Parking	22	▪ 1 shower and change rooms per 10 employee bicycle spaces, where less than 4 facilities are provided, they should be unisex ▪ At least 1 personal locker is to be provided for each Class 1 or 2 bicycle parking space	2 unisex showers & change rooms 22 lockers	6 unisex shower / change rooms 27 lockers

As shown in Table 21, the proposed LBGHS is required to provide a minimum of 2 unisex showers and change rooms, as well as 22 lockers for staff in accordance with LDCP 2008. The proposed development provides 6 unisex showers / change rooms and 27 lockers, this provision is acceptable and meets the requirements of LDCP 2008.

Reference has also been made to The *Green Star Building Guidelines* to ensure the proposed EOTF facilities meet the requirements. For a maximum staffing body of 214 staff the Green Star requirements are detailed below:

- 4 showers (unisex) + 1 additional shower for 1 per 200 occupants above 200– showers must be 900mm x 900mm to enhance usability
- No specific rate for change rooms, assumed change area can be combined with shower
- 1 locker must be provided every eight building occupants or staff

In accordance with the Green Star requirements the proposal is required to provide 5 unisex shower / change areas and 27 lockers as a minimum requirement. The proposal provides 6 unisex showers / change areas and 27 lockers and is therefore compliant with the Green Star requirements.

As for students dedicated EOTF facilities are typically not provided. At the discretion of the school, students may have the ability to utilise the student showers and change rooms, located adjacent to the gymnasium in lower ground of Building C.

6.2.3 Design

Student and staff bicycle parking spaces have been designed for convenience to be near the main site access points. Bicycle storage shall be designed in accordance with AS2890.3. Staff EOTF will ensure compliance with the Green Star requirements at a minimum.

6.3 Proposal

6.3.1 Student and Staff Cyclist Facilities

As previously mentioned, the proposal includes bicycle storage with a capacity for 200 bicycles for students and 22 bicycles for staff. The location of the bicycle parking is shown below in Figure 28 & Figure 29.

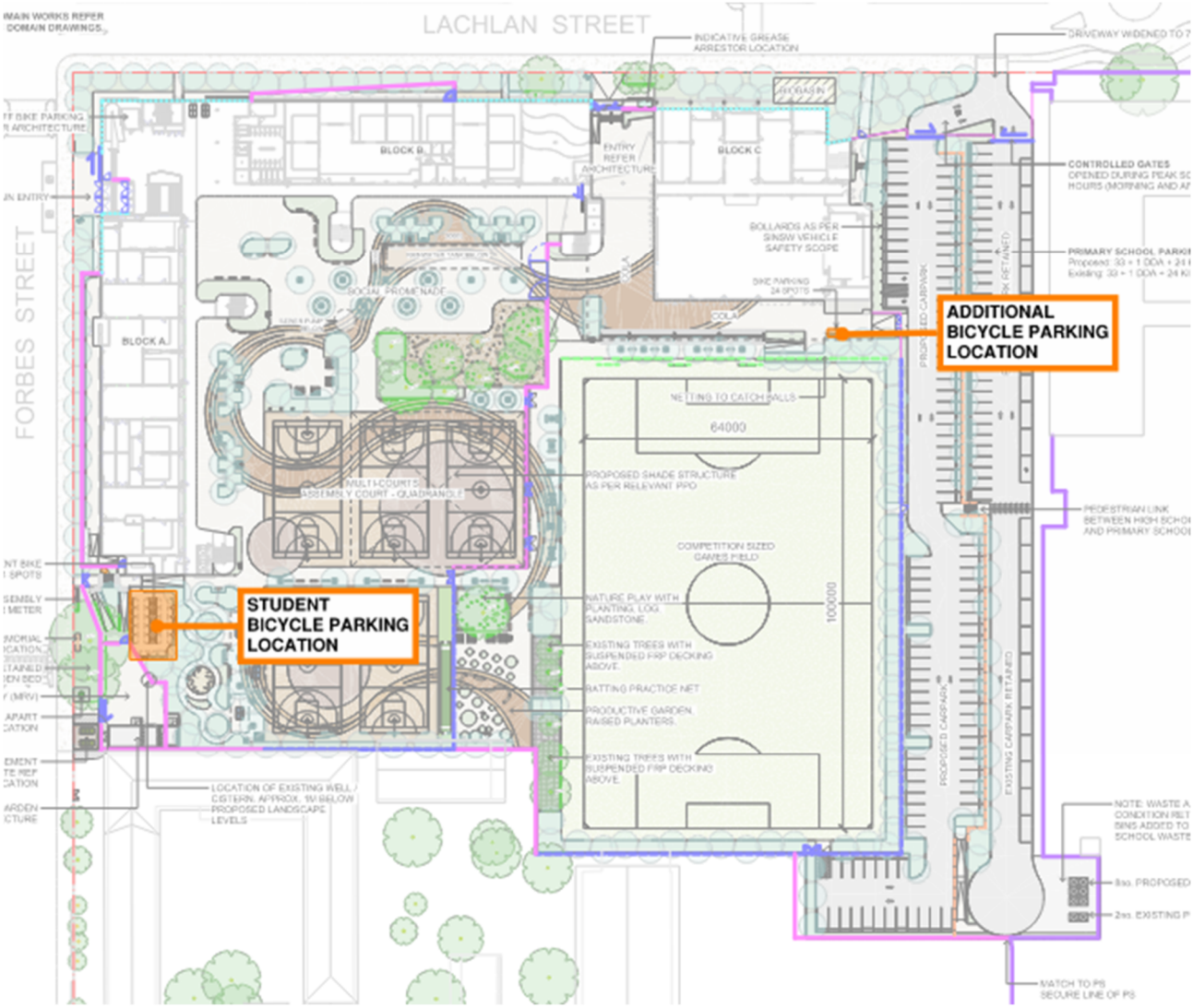


Figure 28: Proposed Student Bicycle Parking Locations

Source: Modified from NBRS

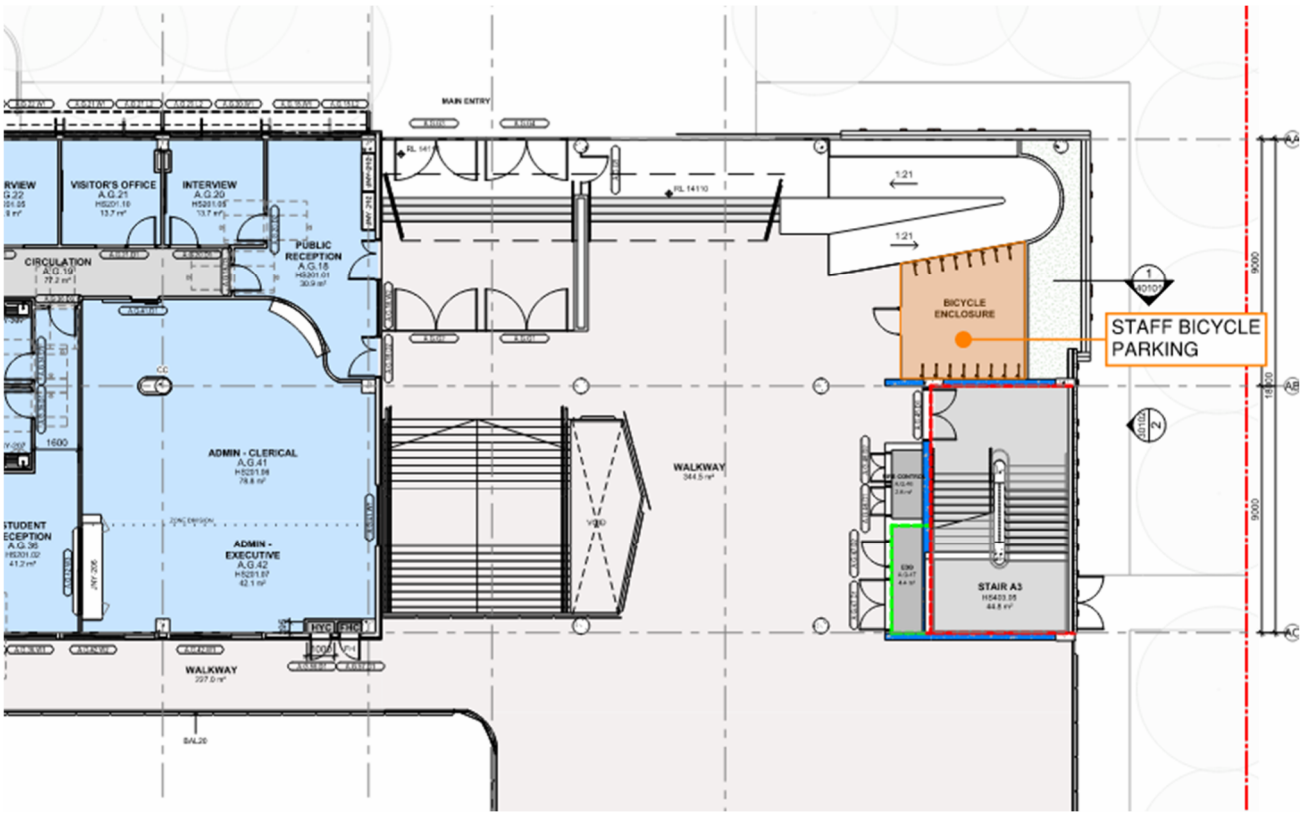


Figure 29: Proposed Staff Bicycle Parking Location
Source: Modified from NBRS

6.3.2 EOT Facilities

The proposed EOTF for staff will be provided at the lower ground of the main building of the school, as shown in Figure 30.

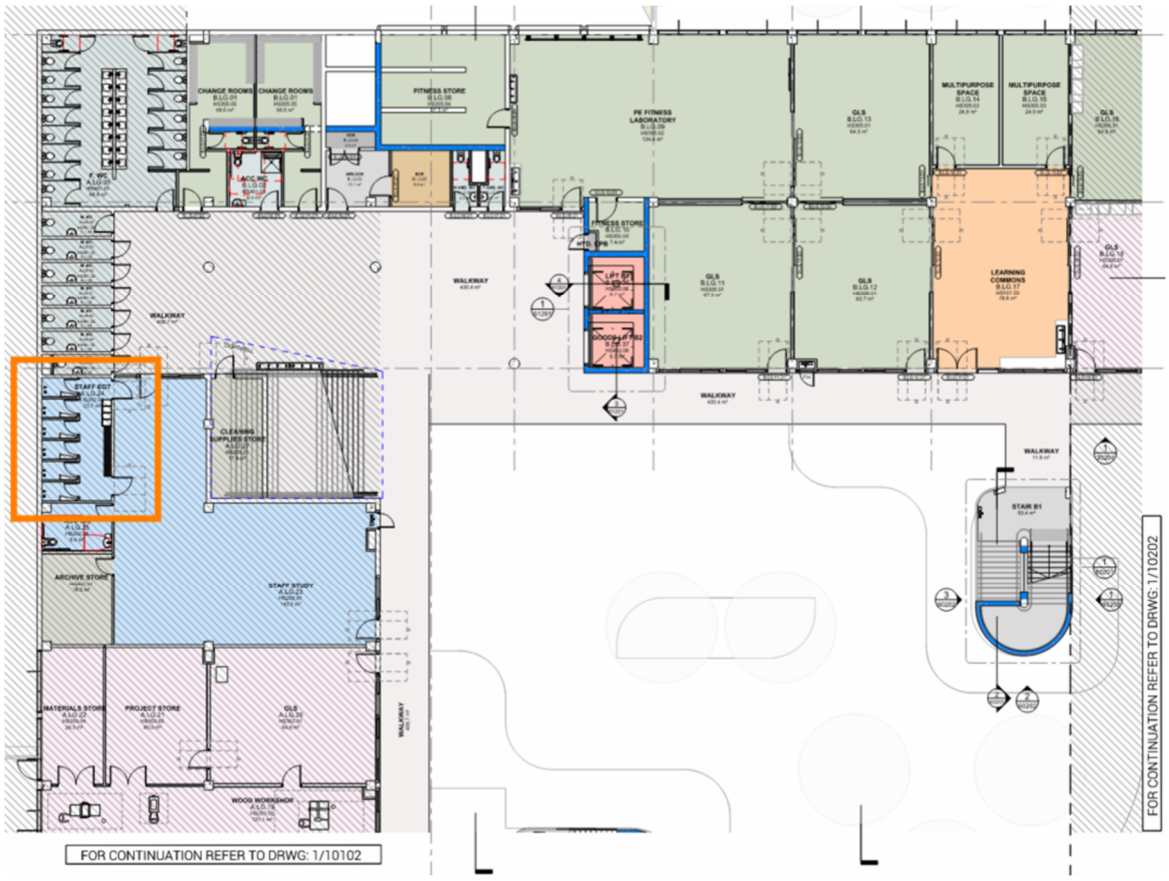


Figure 30: End-of-Trip Facilities for Staff

Source: Modified from NBRS (LBGHS-NBRS-B00A-GB-DR-A-10102)

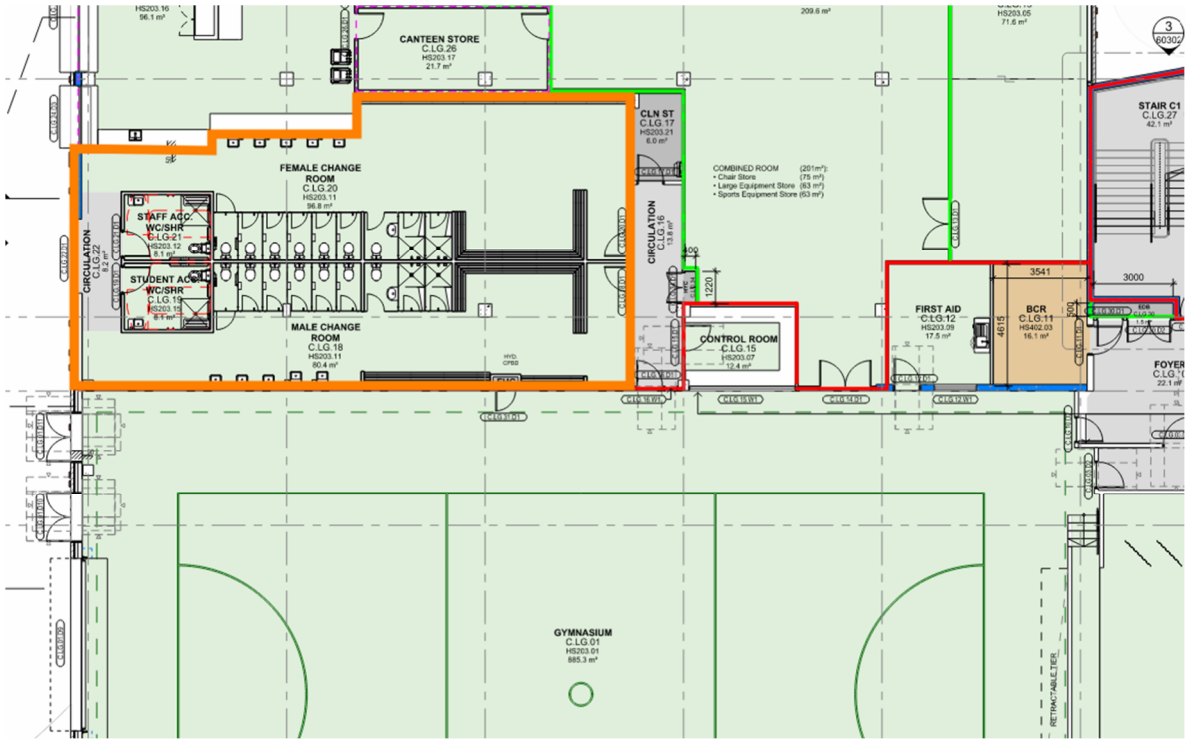


Figure 31: End-of-Trip Facilities for Students

Source: Modified from NBRS (LBGHS-NBRS-B00C-GB-DR-A-10301)

Section 7 Public Transport

7.1 Demands

Future bus and train volumes demand have been calculated in Section 4.3, and are summarised in Table 22 and Table 23 for reference.

Table 22: Summary of Bus Travel Demands

Bus	Baseline			Moderate			Reach		
	Mode Split	Volume		Mode Split	Volume		Mode Split	Volume	
		OY	Max		OY	Max		OY	Max
Students	35%	420	700	36%	432	720	38%	456	**760**
Staff	1%	2	2	7%	12	15	10%	17	**21**

This traffic assessment considers the scenario which results in the largest travel demand for bus usage. As underlined in Table 22**,** the most conservative demand would be students and staff in the reach mode splits with demands for 760 students and 21 staff. The analysis is detailed in Section 7.2.1 and supported with the proposed facilities shown in Section 7.3.

Table 23: Summary of Train Travel Demands

Train	Baseline			Moderate			Reach		
	Mode Split	Volume		Mode Split	Volume		Mode Split	Volume	
		OY	Max		OY	Max		OY	Max
Students	6%	72	120	6%	72	120	6%	72	**120**
Staff	5%	8	11	10%	17	21	14%	23	**30**

This traffic assessment considers the scenario which results in the largest travel demand for train usage. As **underlined** in Table 23, this scenario would be the student and staff numbers with the reach mode splits applied. The analysis of the projected demand is detailed in Section 7.2.2 and supported with the proposed facilities shown in Section 7.3

7.2 Analysis

7.2.1 Bus

As part of the project to improve the public transport mode to the school and to accommodate the increase demand, one of the bus services (819 service) is proposed to be altered to provide bus services from the northwestern part of the school catchment to the school. SINSW is currently consulting with TfNSW to alter the existing bus service to the school. These discussions are currently still ongoing and a confirmed service is yet to be reached. Correspondence between SINSW and TfNSW are detailed in Appendix B.

As shown in Section 2.5.1 and detailed in Section 2.9, the school is well-serviced by bus and an existing 160 metre bus zone is provided at the frontage of the existing LBHS and LGHS schools. As part of the redevelopment of LBGHS, the project is proposing to slightly reduce the length of the bus zone to 140 metres to also accommodate 2 DDA accessible K&R car spaces close to the main entry.

As detailed above, the target demand for bus services is approximately 760 students once the school reaches full capacity. At 50 students per full bus, this would be equivalent to filling 15 buses in each of the morning and afternoon travel periods.

It is anticipated that students and staff travelling to the site by bus would do so on a mixture of general public route services and dedicated school services, subject to future operations to be determined by TfNSW. Buses may be shared by members of the public and/or other schools. Therefore, the demand for 15 full buses would likely be spread across more buses, say 20.

The proposed bus zone capacity could accommodate the forecast demands of the high school in approximately 4 cycles of each bus zones. There is also very minimal change to how the existing operation of the bus zone currently works. From site observations there was an abundance of capacity as bus arrival times were staggered.

7.2.2 Train

It is likely that some students will utilise travel by train as there are some out of area students, as well as a portion of staff who typically travel further than students.

As shown in Section 2.5.2, the distance to Warwick Farm Station is approximately 500 metre to the proposed school. Additionally, the distance to Liverpool Station is approximately 900 metres. The proximity of Warwick Farm Station and Liverpool Station to the school means that travel by train is an accessible and feasible option, with frequent services available throughout the day.

The anticipated demand for train activity (120 students and 30 staff) are considered negligible in the context of broader rail capacity. Pedestrian connections to and from the rain station could comfortably accommodate these volumes, with formal pedestrian pathways available for the full route.

7.3 Proposal

The proposed works include the retention of the existing 73 metre bus zone to the south of the pedestrian crossing on Forbes Street and the reconfiguration of the existing 103 metre bus zone to the north of the pedestrian crossing on Forbes Street as shown in Figure 32.

As part of the new LBGHS the existing bus zone to the north of the crossing on Forbes Street is proposed to reduce in length from 103 metre to 73 metres to accommodate 2 on-street DDA pick up and drop off spaces and relocation of the existing wombat crossing on Forbes Street.

The reduced bus zone length of 73 metres is considered acceptable noting, from on-site observations currently, a maximum of 3 buses arrive at one time and the bus arrival time is spaced between 3-5 minutes from each other. With the provision of two 73 metre bus zones in accordance with the *Bus Infrastructure Guidelines* each bus zone can typically cater for 3-4 buses at any one time, totalling 6-8 buses along Forbes Street at any one time.

The proposed bus zones will have sufficient capacity to continue to accommodate existing and future bus services to / from the site.

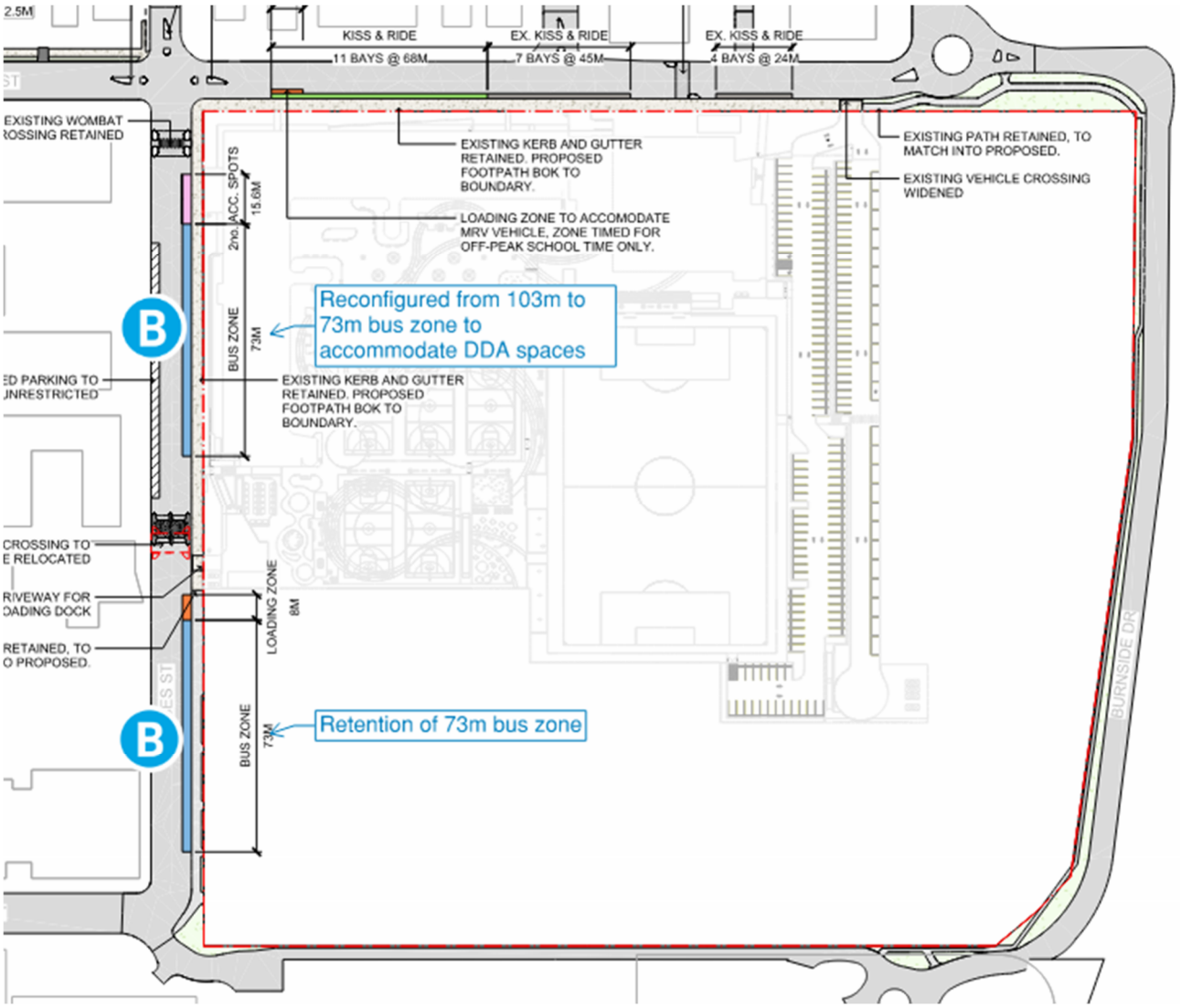


Figure 32: Proposed Bus Zones

Source: Modified from NBRS

Section 8 Loading and Servicing

8.1 Analysis

Referenced has been made to Section 4.4.2 of the LDCP – Part 4 which stipulates that sufficient service and delivery vehicle parking should be provided for the needs of the development.

The project proposes 2 on-site servicing / waste collection areas and 1 on-street loading bay. Waste collection will be serviced at the shared waste collection with GPS at the southern side of the GPS car park and can be accessed via Lachlan Street. The existing waste loading area can accommodate vehicles up to and including a 10.5 metre waste truck. It is anticipated that the site would be serviced maximum once daily, with waste collection occurring 3 times weekly.

This level of provision is considered acceptable noting that the development would generate a minimal demand for service vehicles, with a low number of deliveries expected per day. The proposed service vehicle and waste collection arrangements are therefore considered acceptable and ensure all vehicles will enter and exit the site in a forward direction. Swept path analysis for the loading dock and service vehicle area is provided in Appendix C, with an extract shown in Figure 33

Swept path analysis for the loading dock and service vehicle area is provided in Appendix C, with an extract shown in Figure 33 & Figure 34.

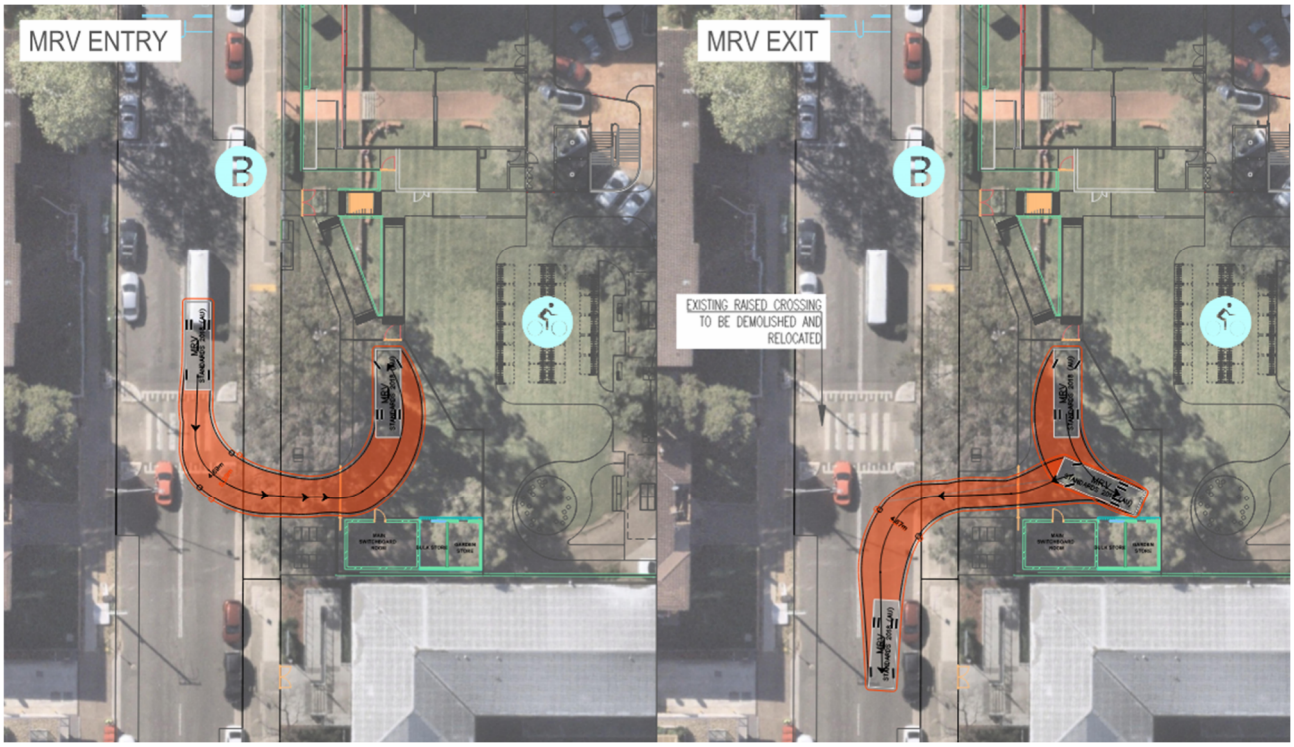


Figure 33: Swept Path of Proposed Loading Area

Figure 34: 10.5m Waste Truck Swept Path

8.2 Proposal

As mentioned previously, the waste collection will be located on the southern side of the GPS car park which can accommodate a 10.5 metre waste truck. Additionally, other deliveries, particularly for woodworks will be serviced via the proposed loading bay to the south-west of the site accessed via Forbes Street. This proposed loading area can accommodate vehicles up to and including an 8.8 metre MRV. The proposed on-street loading bay will be 12.0 metres in length and can accommodate vehicles up to an 8.8 metre MRV. The on-street loading bay will be available outside of school peak period and will be utilised by couriers dropping off items to the main school reception. Figure 35 shows the proposed loading bay locations respectively.

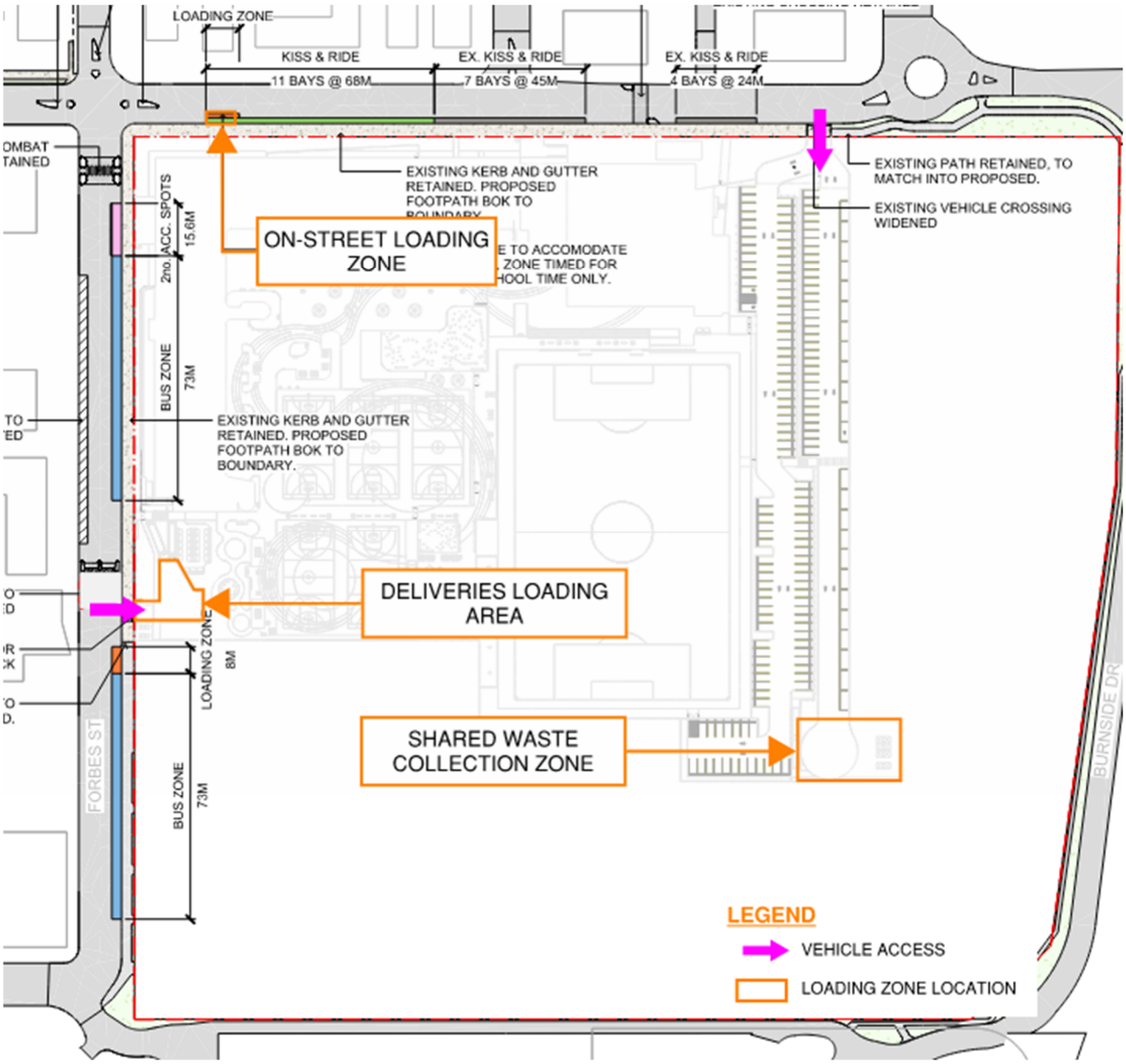


Figure 35: Loading Dock for Service Vehicles and Waste Collection

Source: Modified from NBRS

8.2.1 Emergency Vehicles

There are no dedicated parking areas provided for emergency vehicles, however emergency vehicles can access the staff car park via the vehicle access on Lachlan Street, or alternatively utilise the proposed on-street loading bay on Lachlan Street and enter via the main site access.

Section 9 Kiss & Ride

9.1 Analysis

As previously mentioned in Section 2.9, based on our student location analysis, and our on-site observations the majority of students that travel to school by car are located in the north and south-west of the school catchment. As part of this proposal, we have therefore completed an analysis to assess the traffic impacts on relocating the existing K&R area on Forbes Street to the southern side of Lachlan Street to be utilised by LBGHS. To reiterate this proposal, does not include any operational changes to the existing internal K&R bays at GPS.

To access the site via vehicle, the most convenient routes to and from the site are via Hume Highway, turning right onto either Biggie Street or Remembrance Drive. Similarly, outbound movements observed during site observations were primarily travelling south along Forbes Street and west along Lachlan Street. Further details regarding convenient inbound and outbound traffic vehicle movements are provided below in Figure 36.

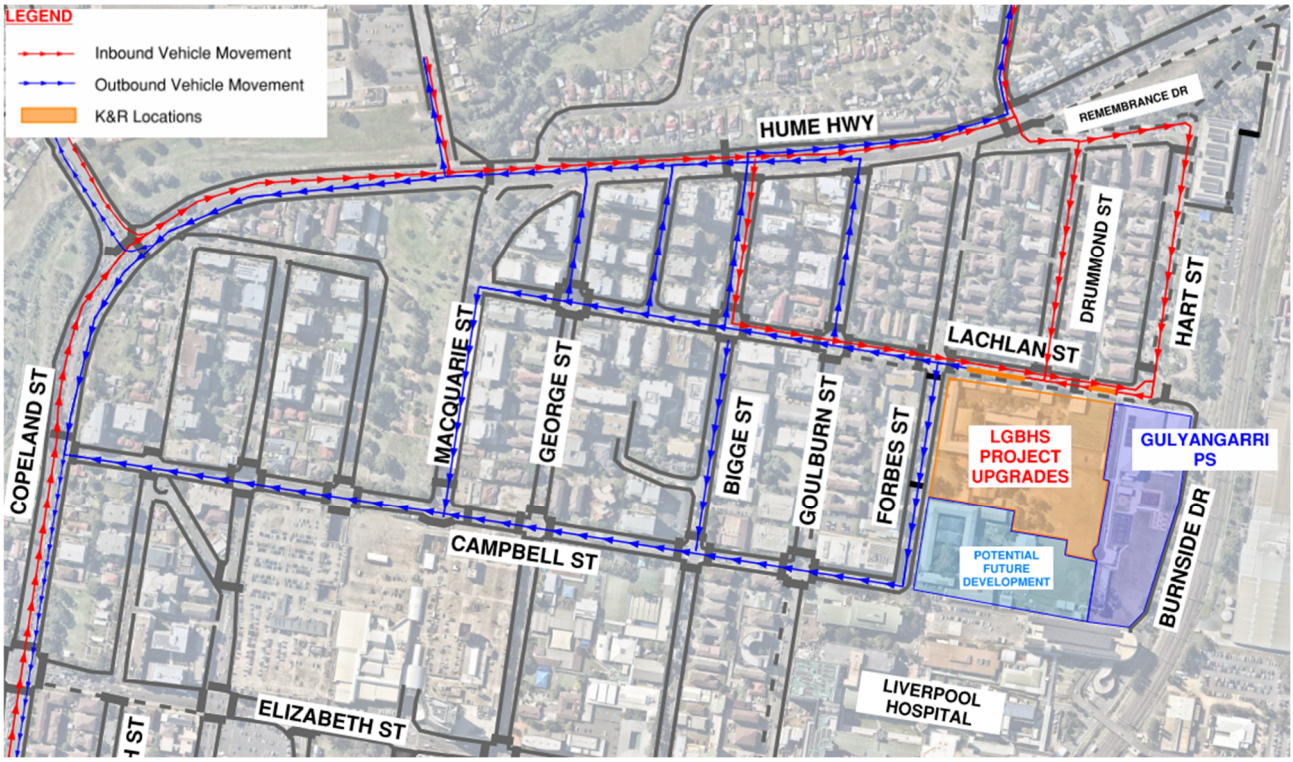


Figure 36: Typical Convenient Inbound and outbound Vehicle Movements to / from the site

The above inbound and outbound student vehicle movements shown in Figure 36 are also consistent with our on-site observations which showed the existing K&R area was underutilised as the majority of vehicles travelled from the west or the north. In addition, as mentioned in Section 2.9, the existing K&R is mostly occupied by parked cars during the AM and PM peak periods, which impacted the use of the K&R facility. Details in relation to the traffic impacts and redistribution of traffic as a result of proposed K&R relocation are discussed in Section 11.

9.2 Proposal

As shown below in Figure 37, the proposal involves the relocation of the existing 78 metre K&R area on Forbes Street to the southern side of Lachlan Street to provide a dedicated 68 metre new K&R zone. There is also an existing 24 metre K&R zone along the southern side of Lachlan Street, adjacent to GPS which is also intended to be utilised by LBGHS. This equates to a proposed total K&R area of 92 metres of dedicated K&R area.

It should be noted that the existing 24 metre K&R zone can be utilised by both the proposed LBGHS and GPS. However, there will be no impact to the traffic due to the staggered bell times between GPS and the proposed LBGHS. A 20 minute buffer in the AM and 40 minutes in the PM will help separate the traffic movements for each school. Further information detailing operation of the K&R facility will be included in the School Transport Plan.

As part of the proposal, 2 accessible parking bays are proposed to provide transport functionality for the special education learning units (SELU). These bays are proposed to be located on the eastern side of Forbes Street, close to the main access, as shown below in Figure 37.

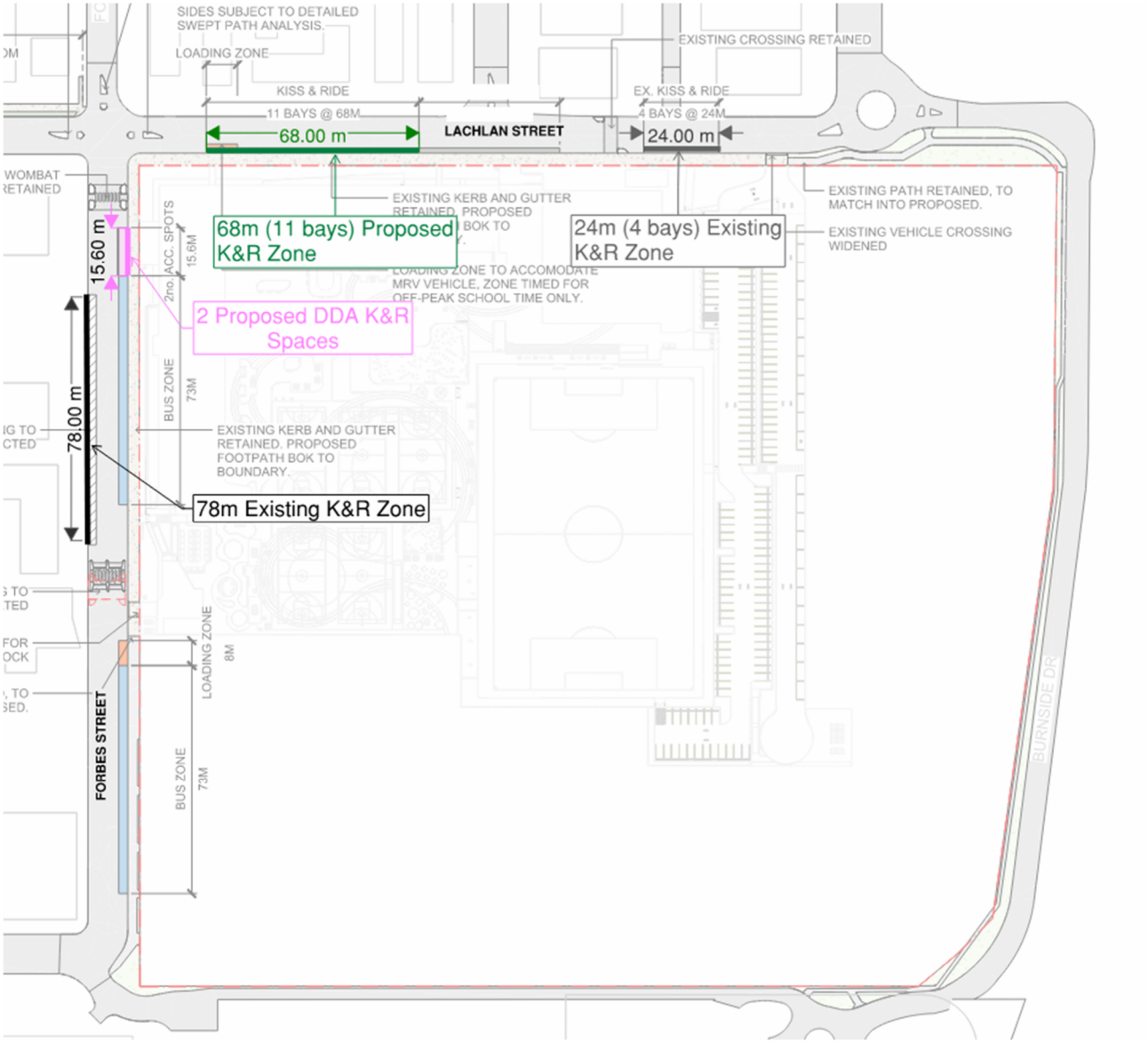


Figure 37: Proposed Kiss & Ride Zones
Source: Modified from NBRS

9.3 Demands

The existing and future K&R traffic volumes have been assessed in the travel mode split scenarios included in Section 4.3. These are summarised below in Table 24, to show the baseline, moderate and reach travel demands in opening year and maximum capacity.

Table 24: Summary of Kiss & Ride Travel Demands

K&R Students	Baseline			Moderate			Reach		
	Mode Split	Volume		Mode Split	Volume		Mode Split	Volume	
		OY	Max		OY	Max		OY	Max
AM	28%	341	**560**	21%	252	420	14%	168	280
PM	23%	280	**460**	21%	252	420	14%	168	280

The traffic assessment confirms that largest travel demand is applying the existing travel mode splits to the maximum student enrolments which shows there is a potential demand of 560 students in the AM and 460 students in the PM travelling by private vehicle.

As previously discussed, the proposal intends to implement strategies to promote public and active transport and in turn reduce current car travel mode splits to approximately 21% in opening year and 14% as the school reaches full capacity and therefore it is highly unlikely LBGHS will operate with a K&R vehicle demand of 560 students in the AM and 460 students in the PM.

Importantly, it is also noteworthy to mention, given LGHS and LBHS are existing schools with a combined approved maximum capacity of 1,860 students (900 students LBHS + 960 students LGHS) the schools currently have the ability to generate 520 K&R trips in the AM and 427 K&R trips in the PM based on the existing mode splits. Therefore, theoretically the proposal would not result in an additional 560 vehicle tips in the AM and 460 vehicle trips in the PM on the external road network, but rather only result in an additional 40 K&R trips in the AM and 33 K&R trips in the PM as a result of the proposed LBGHS maximum capacity.

Whilst it is highly unlikely the existing or proposed schools will be operating with a maximum capacity at existing 'baseline' travel mode splits, to provide a conservative assessment the following sections have adopted the existing 'baseline' travel modes.

9.4 Queueing Analysis

As the proposal intends to relocate the existing K&R area a demand analysis comparison has been completed between the existing and proposed current and maximum student numbers. The adopted volumes for the assessment are **underlined** in Table 24.

Table 25 outlines the existing vehicle demands, and the anticipated arrival rate during the peak period. The values listed may vary in operation, based on the actual turnover time of individual vehicles, and the initiatives in the operational School Transport Plan that will be implemented to ensure reasonable operation of the K&R facilities.

The following key assumptions have been adopted in a base analysis:

- Each K&R bay has a turnover rate of 60 seconds per vehicle
- Each K&R bay would be 6 metres in length
- The existing K&R zone on Forbes Street has the capacity to accommodate 13 vehicles at any one time
- The existing K&R zone on Lachlan Street adjacent to GPS has the capacity to accommodate 4 vehicles at any one time

- A total of 15 vehicles can be accommodated within the proposed 68 metre K&R zone and existing 24 metre K&R zone (The proposed 68 metre K&R zone has the capacity to accommodate 11 vehicles at any one time and the existing 24 metre K&R can accommodate 4 vehicles at any one time).
- 80% of K&R activity would occur over the peak period and an occupancy rate of 1.6 students / vehicle has been adopted[2]

Below, Table 25 provides a comparison of the existing and proposed student vehicle demand associated with the existing and proposed K&R zones on Lachlan Street.

Table 25: Kiss & Ride Queueing Analysis

	Existing LGHS & LBHS		Opening Year		Full Capacity	
Parameter	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**
Student demand	1,216 students	1,216 students	1,200 students	1,200 students	2,000 students	2,000 students
Portion travelling by car within peak	28%	23%	28%	23%	28%	23%
Students travelling to school via private vehicle	341 students	280 students	336 students	276 students	560 students	460 students
Assumed occupancy	1.6 students per vehicle					
Forecast vehicles	213 vehicles	175 vehicles	210 vehicles	173 vehicles	350 vehicles	288 vehicles
K&R Activity Occur over peak period	80%					
Forecast vehicle over peak period	170 vehicles	140 vehicles	168 vehicles	138 vehicles	280 vehicles	230 vehicles
Kerbside available	Approx. 13 bays	Approx. 13 bays	Approx. 15 bays	Approx. 15 bays	Approx. 15 bays	Approx. 15 bays
Turnover required	13 cycles per bay	11 cycles per bay	11 cycles per bay	9 cycles per bay	19 cycle per bay	14 cycle per bay
Assumed turnover rate	1 minute per cycle	1 minute per cycle	1 minute per cycle	1 minute per cycle	1 minute per cycle	1 minute per cycle
Peak duration	**13 minutes**	**11 minutes**	**11 minutes**	**9 minutes**	**19 minutes**	**15 minutes**

As shown above in Table 25 the existing LBHS and LGHS K&R activities, generally operate within 13 minutes in the AM and 11 minutes in the PM. When compared to LBGHS opening year the proposed K&R area will reduce to 11 minutes in the AM and 9 minutes in the PM. This is considered an improvement to existing conditions.

[2] Trip Generation Surveys, Schools Analysis Report 2014 detailed average car occupancy for high schools to be 1.65 and 1.77 in the AM and PM peak hours respectively. A trip rate of 1.6 students was therefore adopted for our assessment.

To complete a worst case assessment a queuing analysis has also been completed utilising the base mode travel modes and applying these to the maximum student and staff capacity which is anticipated to be reached in 2041. As shown above in Table 25, it would result in a maximum K&R turnover time of 19 minutes in the AM and 15 minutes in the PM. However, it is highly unlikely that this scenario would occur as the school's focus on implementing the STP is expected to reduce car travel before reaching full capacity. This vehicle turnover time is considered reasonable for a school of this size and can be managed outside of the GPS peak periods. A STP prior to operation will also be developed to implement mitigation measures to ensure the operation of the K&R area is managed efficiently.

It is therefore considered the proposed, K&R length of 92 metres, accommodating 15 K&R bays results in a better outcome than existing conditions in opening year and is also satisfactory when the school reaches capacity in 2041.

9.4.1 Sensitivity Analysis

A sensitivity analysis has also been completed noting that the above assumptions and values may vary in operation and from day to day. Table 26 presents several combinations that may occur in using different parameters and whether the proposed K&R area can accommodate the changing demand.

Table 26: Sensitivity Analysis

Parameter	Combination 1	Combination 2	Combination 3
Student demand	2,000 Students		
Portion travelling by car within peak	28%		
Students travelling to school via private vehicle	560 students		
Assumed occupancy	1.6 students per vehicle		
Forecast vehicles	350 vehicles		
	Combination 1	**Combination 2**	**Combination 3**
K&R activity occurs over peak period	80%	80%	70%
Vehicles using dedicated K&R	85%	90%	80%
Forecast vehicle over peak period	238 vehicles	252 vehicles	196 vehicles
Kerbside available	Approx. 15 bays	Approx. 15 bays	Approx. 15 bays
Turnover required	16 cycles per bay	17 cycles per bay	13 cycles per bay
Assumed turnover rate	1.5 minutes per cycle	1.25 minutes per cycle	1.25 minutes per cycle
Peak duration	**24 minutes**	**21 minutes**	**16 minutes**

As shown above in Table 26, Combination 1 would result in the longest K&R activity at 24 minutes, while Combination 3 results in the shortest delay of 16 minutes. There is a high likelihood that the full capacity of the proposed LBGHS will not operate with existing travel mode behaviours and therefore this analysis is considered acceptable.

However, the above analysis would not significantly impact the local network beyond the school frontage and would only occur for a short period of time. It is acknowledged that queueing has the potential to occur during the busiest periods before and after school, as a large proportion of vehicles tend to arrive within a short peak period, say, 85% arriving within a 20-minute peak period as assumed in this analysis.

To ensure that minimal impact to the K&R operation management details will be included in the School Transport Plan, which will be developed in consultation with Council and TfNSW prior to occupation.

9.5 Design

9.5.1 General Usage Kiss & Ride Zone

As shown in the cross-section diagrams in Section 3.3.2, the K&R zone on Lachlan Street is proposed to be 2.3 metres wide. The existing road has sufficient capacity to accommodate K&R zone without the need for road widening.

As a point of reference, Australian Standards AS2890.5 for on-street parking facilities requires a parking space width of 2.0 to 2.3 metre for a road with a 50km/h speed limit. It is acknowledged that a K&R zone operates differently to an on-street parking lane with more movements to and from the kerbside lane and high volumes of activity occurring in a short period of time. The proposed 2.3 metre width caters for this type of operation by providing a greater buffer to the adjacent lanes, and ensuring vehicles have adequate space to manoeuvre in and out of the kerbside lane and between other vehicles stopped in the K&R lane.

9.5.2 Accessible Kiss & Ride Bays

The Forbes Street K&R zone has been designed to accommodate two accessible parking bays to provide transport functionality for the SELU rooms. These bays have been designed in accordance with AS2890.5 and AS2890.6 at a width of 3.2 metre, higher than the standard minimum width of 2.0 metre for kerbside parking. AS2890.5 is a specific design document for on-street parking facilities and includes this guidance for accessible parking design, which is a typical type of on-street parking configuration.

Figure 38 is an extract from AS 2890.5 which provides the design guidance for these facilities. Final arrangements for signage and line marking of these bays will be subject to future coordination with, and approval by, Council's Local Traffic Committee.

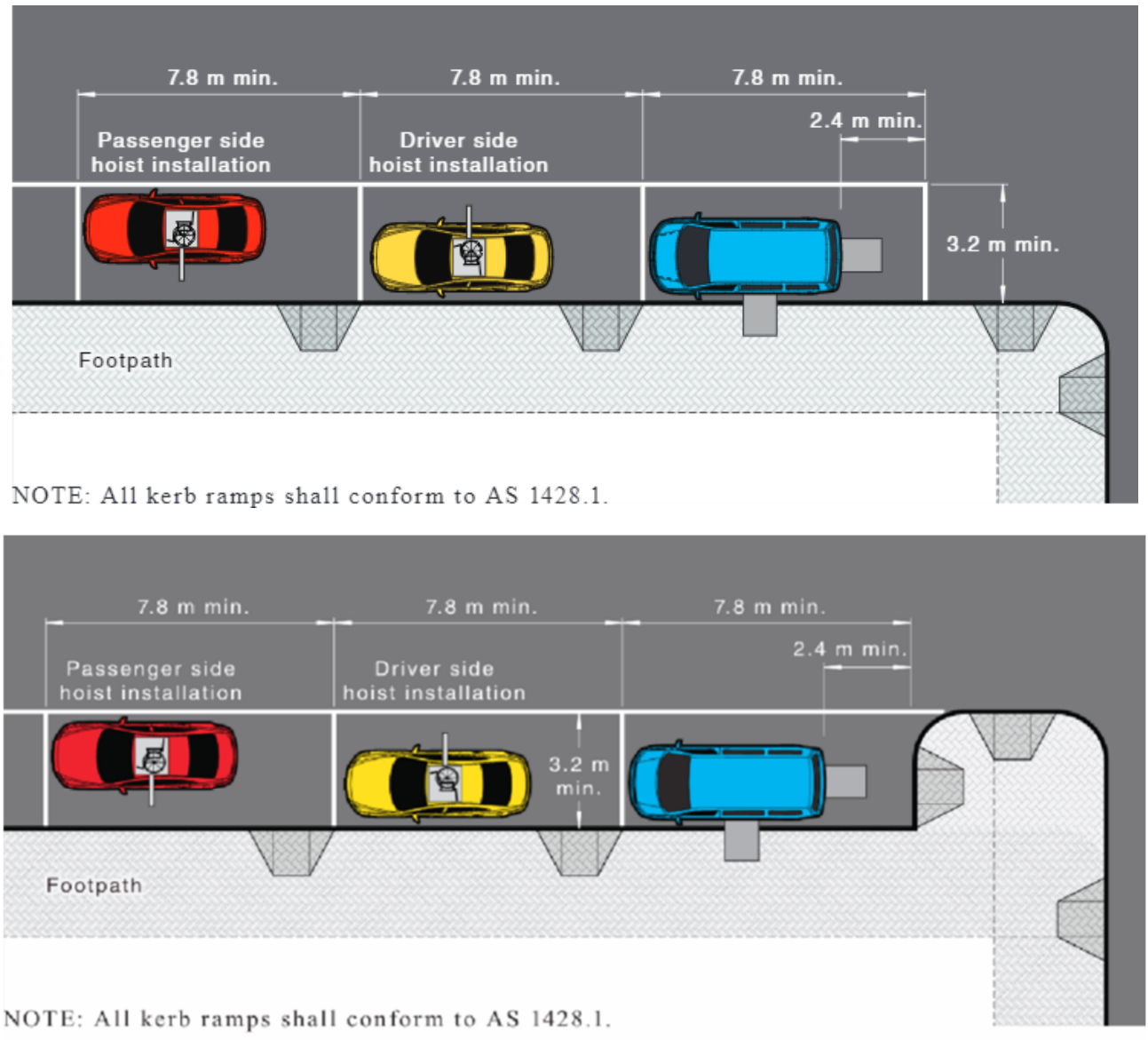


Figure 38: Compliant Design Options for Accessible Parallel Parking Bays (On-street)
Source: Australian Standard AS2890.5 (Figures 4.2 and 4.3)

Section 10 Car Parking

10.1 Demands

Future car parking demands for staff in opening year and full capacity have been calculated in the travel mode scenarios included in Section 4.3, and are summarised in Table 27 for reference. It is noteworthy to mention, no on-site parking will be provided for students, similar to the current operation.

Table 27: Summary of Car Parking Demands

Car Parking	Baseline			Moderate			Reach		
	Mode Split	Volume		Mode Split	Volume		Mode Split	Volume	
		OY	Max		OY	Max		OY	Max
Students	3%	36	**60**	0%	0	0	0%	0	0
Staff	93%	154	**199**	65%	108	139	50%	83	107

As shown above in Table 27, it is acknowledged that the scenario resulting in the largest travel demand would be the maximum capacity applied to the existing baseline modes splits. However, as further detailed in the following sections, due to the maximum capacity not being achieved for a number of years (forecasted 2041) and a combination of site constraints and provision of alternative travel measures, it is reasonable to design and provide for a staffing car park demand of 107 staff car spaces, as per the reach mode splits and overall transport strategy of the project.

It is also important to acknowledge, the existing travel mode split of 93% applied to the opening year staff results in a demand of 154 car spaces. The following sections provide a detailed assessment of the parking provision and its adequacy to ensure in both opening year and maximum capacity there will be minimal adverse impacts on the external road network.

10.2 Proposal

The proposed LBGHS will provide a total of 112 car parking spaces including 2 accessible parking spaces within a separated high school staff car park. The proposed car park will be accessed via the existing GPS vehicle access on Lachlan Street. The layout of the proposed car park is illustrated below in Figure 39.

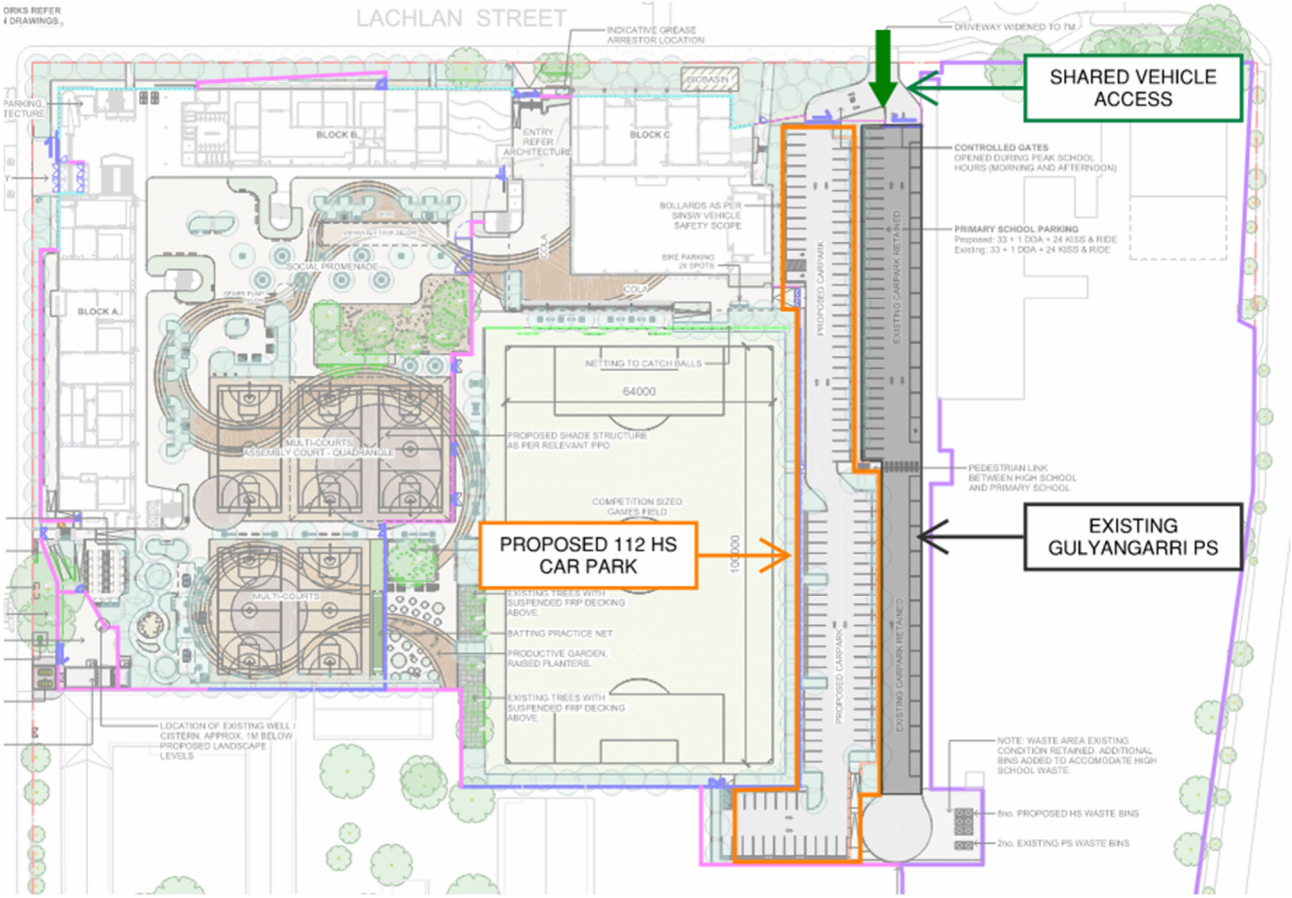


Figure 39: Proposed Car Park
Source: Modified from NBRS

10.3 Analysis

10.3.1 Liverpool Council DCP Parking Requirements

Reference was made to LDCP, Part 4 which sets out the car parking requirements for different development types within Liverpool city centre. Table 28, below shows the parking requirements in accordance with the LDCP, part 4 and the proposed provision in response.

Table 28: LDCP Car Parking Requirement & Provision

Liverpool DCP 2008	Land Use(s)	DCP Parking Rate	Proposed No. / GFA	Number of Parking Required	Car Parking Provision
Part 4 – Development in Liverpool City Centre	**Car Parking in Liverpool City Centre** All other development	1 space per 100m^2 of floor area	20,069 m^2 GFA	201 spaces	112 spaces

As shown above in Table 28, Liverpool City Centre parking rates require a total of 201 car spaces in accordance with LDCP Part 4. In response, the proposal provides a total of 112 staff car parking spaces. The proposal will deviate from LDCP, Part 4 requirements, however it is important to highlight the Liverpool City Centre parking rates do not provide a specific parking rate for schools, but rather encompass all forms of development in the Liverpool City Centre based on floor area. While some developments may be applicable to adopt this parking rate, school parking provisions cannot be applied to this rate, as floor area and parking demand are not necessarily correlated.

The proposed LBGHS provides 112 staff car parking spaces, this is a deficiency of 89 car spaces in accordance with the DCP and 32 car spaces when compared to the existing LGHS and LBHS parking provision. The adequacy of the proposed parking provision is addressed below in the following sections.

10.3.2 Other Development Control Plan School Parking Rates

A comparison of educational establishment parking rates in other DCPs through metropolitan Sydney is demonstrated by the parking rates provided in Table 29.

Table 29: Other DCPs Parking Requirement

DCP Reference	DCP requirements	Capacity	Parking Space Requirements
Ryde DCP 2014	1 space per 2 staff members	214 Staff & 2000 Students	107 parking space
Auburn DCP 2010	1 space per 2 staff members		107 parking space
Marrickville DCP 2011	Between 1 space per 2 staff members and 1 space per 5 staff members (depending on locations)		43 to 107 parking space
Willoughby DCP 2016	1 space per 2 staff members		107 parking space
Canterbury - Bankstown DCP 2023	1 car space per employee or classroom, whichever is the greater; and 1 car space per 8 students in year 12[1]		236 parking space (214 staff + 42 students)
Fairfield CityWide DCP 2024	1 space per employee plus 1 space per 10 students in Year 12 (where applicable)[1]		247 parking space (214 staff + 33 students)

[1] Assume total students are distributed evenly between Year 7 to Year 12.

Table 29 indicates that there are a number of LGAs which provide a parking rate of 1 space per 2 staff for schools. Whilst Canterbury-Bankstown LGA adopts a higher parking rate of typically 1 car space per employee it is noteworthy to mention, a draft masterplan for city centres within the LGA including Campsie and Bankstown Centre are currently on exhibition and have proposed city centre parking rates are provided at maximum rates

rather than minimum. It is therefore likely in the future Canterbury-Bankstown centres will also be adopting reduced parking rates for schools located in city centres.

In reference to the proposed LBGHS which proposes a maximum capacity of 200 staff, adopting the 1 space per 2 staff would equate to a provision of 107 parking spaces. A proposed parking provision of 112 staff car parking spaces is therefore typically aligned with other LGAs and is considered supportable.

10.3.3 Comparison between Existing and Proposed Parking Provision

Given the site is intended to operate similarly to existing conditions in opening year it is important to provide a comparison between the existing and proposed parking provision. Table 30 provides a comparison of the existing and proposed parking provision adopting the existing staff car travel mode split as a conservative measure.

Table 30: Existing & Proposed Opening Year Parking Provision

	Staff No.	Staff Car Mode Split	Demand	Car Park Provision	Deficiency
Existing	166	93%	154 car spaces	144 car spaces	-10
Opening Year	166		154 car spaces	112 car spaces	-42
Maximum Capacity	214	50%	107 car spaces	112 car spaces	+5

As shown above in Table 30, the existing LGHS and LBHS car parks currently provide a total of 144 parking spaces with a current demand of 154 parking spaces, noting that currently 10 staff do not have availability to park on-site.

LBGHS in opening year will provide 112 car parking spaces, if the existing car mode share is applied a demand of 154 parking spaces is required, meaning 42 staff would be unable to park on-site. The proposal intends to ensure the staff car mode share splits are reduced from 93% to the 65% in opening year to ensure all staff can park on-site. A reduction in private car demand will be achieved through the following measures:

- Opening year is anticipated for 2028, this provides 4 years for SINSW to implement new trends and travel behaviours into the existing LGHS and LBHS to encourage and promote staff to travel to / from school via alternative modes of transport. Further details and initiatives are set out in the primary site-specific School Transport Plan (STP).
- As discussed at length in Section 4 and throughout this document, the project is seeking to use the opportunities presented by the redevelopment to improve the existing targets for travel behaviour which differs from the existing school. In order to avoid generating high levels of additional vehicular traffic through induced demand, transport provisions and capacity (including car parking provision) are specifically targeted to achieve a mode shift away from private vehicle usage.
- The site is located within Liverpool City Centre and is well serviced by existing public transport facilities as detailed in Section 2. Specifically, there are frequent bus services within less than 100 metres of the school, in addition, Warwick Farm and Liverpool Train Stations are located within 0.5km and 0.9km respectively. With excellent public transport services within the vicinity of the site it is encouraged that utilisation of these services are promoted.
- To assist with a transition of a lower on-site parking provisions for staff, a site-specific STP will be prepared. The STP shall provide information to influence the travel behaviour away from the use of private vehicles, towards more efficient modes of transport including active transport such as walking and cycling; public transport such as rail and bus services, and car share / carpool options. The plan will also propose mitigation measures and transport programs that the school will commit to i.e. public transport incentives and carpooling programs for staff.
- If staff do wish to drive to site, there are a number of public car parks within the vicinity of the site staff can utilise as an alternative to parking on-site. Specifically, the Warwick Farm Station commuter car park which

is only 500 metres or a 5-10 minute walk to the site. In addition, whilst in high demand, there is an abundance of unrestricted on-street parking within the vicinity of the site. Specific areas are shown on Figure 13.

- A provision of 112 car parking spaces will accommodate 65% of staff in opening year and 50% of the maximum capacity of staff which is considered sufficient given the sites location. To support the sustainable transport strategy for the project and work towards this target car parking demand, the following is provided:
    - The proposed school provide storage for approximately 22 staff bicycles, as well as showers and change facilities. This ensures that active transport is a good and accessible option for staff and assists in reducing travel by car. The bicycle storage area is fully enclosed and is adjacent to staff shower and change facilities, providing an excellent level of amenity.
    - The Department of Education is currently reviewing and considering options for local staff recruitment, i.e. encouraging employment of staff who live in close proximity to the site. All recruitment will continue to be decided on a merit basis, with proximity to site being just one element in the recruitment process. Higher numbers of staff living close to the site, compared to other typical schools, will allow the walking and cyclist mode shares to be increased.

It is acknowledged that the target mode splits are ambitious and depart reasonably significantly from the average existing conditions. However, as mentioned the mode splits are considered achievable due to the considerations listed above, and the opportunity of the redevelopment of the existing school to establish new and improved travel habits. This departure from the predominant travel mode splits have been discussed with SINSW and has been unilaterally agreed that this approach is supported and will be actively facilitated.

10.3.4 Accessible Parking

Section 4.4.2. of LDCP, part 4 stipulates a minimum rate of 2% of the total parking generated for by development shall be accessible parking spaces. Based on 112 proposed car spaces, the development is required to provide a minimum of 2 accessible parking spaces. In response, the proposed development provides 2 accessible spaces and is therefore compliant with the LDCP, Part 4. All accessible parking will be designed as per AS 2890.6.

The Building Code of Australia (BCA) defines accessible parking requirements as a portion of total capacity depending on the land use. The BCA Design Assessment Report prepared by Design Confidence defines the proposal as a mixture of Class 5, Class 7b and Class 9b facilities. In accordance with Section D4D6 of the BCA, accessible parking for each of these classifications is required at a rate of 1 space for every 100 car parking spaces or part thereof (1%). The development is required to provide a minimum of 2 accessible parking spaces.

The proposed design provides 2 accessible spaces, complying with the BCA.

10.4 Design

10.4.1 Staff Parking Spaces

Car parking is to be provided in accordance with AS2890.1:2004. Key design parameters for 90-degree angled parking include:

- Classification: Class 1 (all-day employee parking) or higher
- *Note: Higher classes are typically only required for higher turnover usage and would not be required for this use class, however does have a narrower aisle width (with wider space) which can be a useful design option to consider.*
- Parking space width: 2.4 metre or higher
- Aisle width: 6.2 metre (or as required by class)
- Parking space length: 5.4 metre
- Gradient: 1:20 (5%) maximum

Swept path analysis for the car park and vehicle access point is provided in Appendix C.

10.4.2 Accessible Parking Spaces

Accessible parking is to be provided in accordance with AS2890.5: 2020. Key design parameters for accessible parking include:

- Classification: Class 1 (all-day employee parking) or higher
- Parking space width: 2.4 metre or higher
- Aisle width: 6.2 metre (or as required by class)
- Parking space length: 5.4 metre
- Gradient: 1:20 (5%) maximum
- A shared area on one side of the accessible space of 2.4 metre wide x 5.4 metre long

10.5 Operation

10.5.1 Vehicle Access

The proposed LBGHS car park will be accessed via the existing GPS vehicle access onto Lachlan Street. It is intended that the proposed LGHBS and GPS car parks will be completely separated and controlled by separate sliding gates. The school gates are also intended to remain open during busy peak pick-up and drop-off / arrival and departure peak periods but will remain closed out of peak times.

Given different school bell times and entering / departing times at both schools it is intended neither school peak traffic generation period will overlap. Further details are provided below.

GPS Current Peak periods

To ensure the existing GPS vehicle access currently operates satisfactorily with no adverse impacts to Lachlan Street, TTW have completed a number of site inspections during the morning and afternoon peak periods. The site inspections were completed during Term 4, week 4 2024 on **Monday 4th November, 2024** afternoon observations between 1:45 - 3:30pm and **Wednesday 6th November 2024** Morning observations between 8:00 - 9:30am and afternoon observations between 1:45 - 3:30pm. The following summary of GPS site observations is noted below:

- The GPS morning peak period occurred during school drop-off for 15 minutes between 8:20am – 8:35am
- The GPS afternoon peak period occurred during school pick-up for 20 minutes between 2:20pm – 2:40pm
- The existing vehicle access operates as left in left out and generally operates with no on-street queuing during the morning peak period and minimal on-street queuing for 2-3 minutes along Lachlan Street in the afternoon peak period.
- The afternoon on-street queueing was observed for a maximum of 2-3 minutes at the Lachlan Street / Hart Street / Burnside Drive roundabout. The queue was observed to be a complete stop for 2 to 3 minutes due to vehicles giving way to students crossing the GPS vehicle access to travel west on Lachlan Street.

Whilst on-street queuing was only observed for a maximum of 2-3 minutes and resulted in a maximum queue of 10 vehicles, to resolve this issue SINSW are proposing to employ a school crossing supervisor at the vehicle access to hold pedestrians for ~10 seconds to allow vehicles to enter the site and to avoid queueing along Lachlan Street.

LBGHS Proposed Staff Arrival and Departure Times

It is intended, the proposed LBGHS will operate very similar to the existing schools and therefore to provide a better understanding of existing staff arrival and departure times, a reference was made to the existing survey results collected for the existing LGHS and LBHS. Table 31 provides a comparison between GPS peak periods and LBGHS peak periods.

Table 31: GPS & LBGHS Traffic Peak Arrival / Departure Times

Peak Period	GPS	Staff LBGHS
Morning Arrival Peak	8:20-8:35am	7:15-8:15am
Afternoon Departure Peak	2:20-2:40pm	3:30-4:30pm

As shown, in Table 31 currently, based on on-site observations, GPS morning peak period occurs during the drop-off period between 8:20-8:35am. When compared to the existing staff arrival times for LGHS and LBHS it is understood the majority of staff arrive between 7:15-8:15am. It is therefore considered the majority, of staff associated with LBGHS will arrive at the site prior to the GPS morning peak period. Nevertheless, if there is a slight overlap of staff entering the site at the same time students are being dropped off, it is intended there will be no adverse impacts along Lachlan Street as the site access is proposed to be patrolled, ensuring minimal on-street queuing along Lachlan Street. When vehicles are existing the site, there is sufficient on-site capacity for queueing internally.

Table 31 also shows based on on-site observations, GPS afternoon peak period occurs during the afternoon pick-up period between 2:20-2:40pm. When compared to the existing staff departure times for LGHS and LBHS it is understood the majority of staff depart between 3:30-4:30pm. As LBGHS is not proposed to finish until 3:06pm it is therefore very unlikely staff and student vehicle trips will overlap. Site observations confirmed after the GPS school pick-up traffic along Lachlan Street is free flowing with no queuing, therefore staff exiting the site between 3:30-4:30pm will have no impact on Lachlan Street.

Reference can also be made to Section 11.7.6 which has completed traffic modelling incorporating the proposed LBGHS vehicle trips at the existing GPS vehicle access.

A detailed School Transport Plan and the Travel Access Guide will be provided with management of the proposed LBGHS staff car park, prior to operation, to ensure both staff and parents are aware of the traffic management arrangements of the existing and proposed LBGHS.

10.6 Car Parking Operation

As previously mentioned, the LBGHS and GPS car parks will be completely separated during typical operations. However, in the event either school is hosting a large gathering at the school i.e. school show, parents' meeting, etc. Both the LBGHS and GPS car parks will be available to be utilised by vehicles. Detailed vehicle-swept paths have also been included within Appendix C for reference.

Section 11 Traffic Analysis

11.1 Traffic Generation

As discussed in Section 3, the proposal is for redevelopment of the existing LGHS and LBHS with a proposed full capacity of 2,000 students and 214 staff. SINSW enrolment forecasts estimate in opening year LBGHS enrolments will be very similar to current enrolments with approximately 1,200 students and 120 staff. The school capacity will be reached gradually with an anticipated maximum capacity year of 2041.

11.1.1 Student Trip Generation

While a shift towards greater sustainable transport is anticipated, a conservative approach has been adopted for the traffic assessment, using the existing baseline car mode share of 28% for students. Reliance on vehicles is expected to decrease over time with the implementation and success of the School Transport Plan and therefore this assessment is considered to be extremely conservative. Table 32 provides a summary of the existing and proposed student traffic volumes and the net difference in opening year and ultimate year.

Table 32: Student AM Traffic Generation Estimates

	Existing	Opening Year	Ultimate Year Maximum Capacity	Opening Year Net Difference from Existing	Ultimate Year Net Difference from Existing
No. of Students	1,216	1,200	2,000	-16	784
AM Car Mode Share	28%[3]	28%	28%	0%	0%
Total Travel Demand	680 (340 in, 340 out)	672 (336 in, 336 out)	1,120 (560 in, 560 out)	-8 (-4 in, -4 out)	+440 (220 in, 220 out)
Vehicular Occupancy students per car	1.6	1.6	1.6	0	0
Number of Student Trips	425 (213 in, 213 out)	420 (210 in, 210 out)	700 (350 in, 350 out)	-6 (-3 in, -3 out)	**+274** (137 in, 137 out)

[3] These figures are obtained by averaging existing mode share for both LBHS and LGHS during the AM peak

Table 33: Student PM Traffic Generation Estimates

	Existing	Opening Year	Ultimate Year Maximum Capacity	Opening Year Net Difference from Existing	Ultimate Year Net Difference from Existing
No of Students	1,216	1,200	2,000	-16	784
PM Car Mode Share	23%[4]	23%	23%	0%	0%
Travel Demand	560 (280 in, 280 out)	552 (276 in, 276 out)	920 (460 in, 460 out)	-8 (-4 in, -4 out)	360 (180 in, 180 out)
Vehicular Occupancy students per car	1.6	1.6	1.6	0	0
Number of Student Trips	350 (175 in, 175 out)	345 (173 in, 173 out)	576 (288 in, 288 out)	-5 (-3 in, -2 out)	**+226** (113 in, 113 out)

Due to the school being redeveloped into a single co-ed school, LBGHS will have a slight reduction in student vehicle trips in opening year when compared to existing conditions, as shown in Table 32 & Table 33.

When the school reaches maximum capacity, by applying the baseline mode share it is expected to result in an increase of +274 (137 in 137 out) vehicle trips in the AM and +226 (137 in 137 out) vehicle trips in the PM.

To provide a conservative assessment, **no deduction** in student traffic generation has been applied when modelling opening year scenarios. The **additional** +274 vehicle trips in the AM and +226 vehicle trips in the PM have been added to the ultimate 2038 modelling scenarios.

[4] These figures are obtained by averaging existing mode share for both LBHS and LGHS during the PM peak

11.1.2 Staff Trip Generation

While a shift towards greater sustainable transport is anticipated, a conservative approach has been adopted for the traffic assessment, using the existing baseline car mode share of 93% for staff. Table 34 has been developed to estimate the staff traffic generation based on the opening year and ultimate year.

Table 34: Staff AM Peak Traffic Generation Estimates

	Existing	Opening Year	Ultimate Year Maximum Capacity	Opening Year Net Difference from Existing	Ultimate Year Net Difference from Existing
No of Staff	166	166	214	0	48
Car Mode Share	93%[5]	93%	93%	0%	0%
Travel Demand	154 (154 in, 0 out)	154 (154 in, 0 out)	199 (199 in, 0 out)	0	+45
Vehicular Occupancy	1 staff/vehicle			0	0
Number of Staff Trips	154 (154 in, 0 out)	154 (154 in, 0 out)	199 (199 in, 0 out)	0	**+45** (45 in, 0 out)

Table 34 indicates that, for the opening year adopting the existing mode split no change in traffic generation is anticipated. When the school reaches maximum capacity, by applying the baseline mode share it is expected to result in an increase of +45 staff vehicle trips during the AM peak period.

It is noteworthy to mention, the PM peak period traffic generation utilises the same travel mode splits, and therefore the traffic generation results are the same as presented above in Table 34, the only difference being vehicles are exiting the site as staff leave to go home (i.e. 154 vehicle trips (0 in, 154 out).

To provide a conservative assessment, **no deduction** in staff traffic generation has been applied when modelling opening year scenarios. The **additional** +45 vehicle trips in the AM and PM have been added to the ultimate 2038 modelling scenarios. To reiterate this is an extremely conservative approach, particularly as the proposal provides a restrained level of on-site parking for staff with a ~50% provision in 2038. Targets to achieving the target 50% mode share split have been set out in Section 4 and the Preliminary STP Report respectively. The traffic generation and trip distribution details are also provided in Appendix D.

[5] These figures are obtained by averaging existing staff mode share for both LBHS and LGHS.

11.2 Cumulative Traffic Generation

The assessment considers the cumulative impact of future development in the area. The developments considered are detailed below.

11.2.1 Gulyangarri Public School

GPS has a recent development approval (SSD 10391), it commenced operations in Term 1, 2024 and is located adjacent to LBGHS, at the corner of Lachlan Street and Burnside Drive. Including a preschool which opened in Term 4, 2024.

The school currently has an enrolment of 209 students including preschool students, with a Stage 1 capacity of up to 580 students and a full capacity of 1,280 students at Stage 2. Traffic generation and distribution estimates have been sourced from the *New Liverpool Public School Transport and Accessibility Impact Assessment (Stantec, June 2021)* and the *Modification Transport Assessment Addendum (Stantec, October 2022).*The additional traffic not captured as part of the traffic surveys completed in August 2024 from GPS students and staff are shown in Table 35 & Table 36.

Table 35: GPS Student Traffic Generation

	Existing	Stage 1	Stage 2	Stage 1 Net Difference from Existing	Stage 2 Net Difference from Existing
No of Students	209	580	1,280	371	1,071
Car Mode Share	45%[6]	45%	45%	0	0
Travel Demand	188 (94 in, 94 out)	522 (261 in, 261 out)	1,152 (576 in, 576 out)	334 (167 in, 167 out)	964 (482 in, 482 out)
Vehicular Occupancy	2 students per vehicle[7]			0	0
Number of Student Trips	94 (47 in, 47 out)	261 (131 in, 130 out)	576 (288 in, 288 out)	167 (83 in, 84 out)	482 (241 in, 241 out)
Peak proportion of student trips	85%[6]	85%	85%	0	0
Number of Student Vehicles	**80** (40 in, 40 out)	**222** (111 in, 111 out)	**490** (245 in, 245 out)	**+142** (71 in, 71 out)	**+410** (205 in, 205 out)

As shown in Table 35, the existing GPS students are currently generating 80 vehicle trips (40 inbound, 40 outbound). In Stage 1, it is expected that a maximum of 222 vehicle trips (111 inbound, 111 outbound) will be generated which results in an increase of 142 vehicles (71 inbound, 71 outbound) from existing conditions. At Stage 2 full capacity, GPS is expected to generate 490 vehicles (245 inbound, 245 outbound) which is and additional 410 vehicles (205 inbound, 205 outbound) from existing conditions.

These additional traffic volumes for Stage 1 and Stage 2 have been incorporated into the traffic modelling assessment.

[6] This number is obtained from Section 3.8 of the New Liverpool Primary School TAIA
[7] This number is obtained from Section 6.1 of the New Liverpool Primary School TAIA

Table 36: GPS Staff Traffic Generation

	Existing	Stage 1	Stage 2	Stage 1 Net Difference from Existing	Stage 2 Net Difference from Existing
No of Staff	40	40	98	0	58
Car Mode Share	51%[8]	51%	51%	0	0
Travel Demand	20	20	50	0	30
Vehicular Occupancy	1.5 staff per vehicle[8]			0	0
Number of staff Trips	13	13	33	0	20
Peak proportion of staff trips in AM	54%	54%	54%	0	0
Peak proportion of staff trips in PM	31%[8]	31%	31%	0	0
Number of Staff Vehicles in AM	**7** (7 in, 0 out)	**7** (7 in, 0 out)	**18** (18 in, 0 out)	**0** (0 in, 0 out)	**11** (11 in, 0 out)
Number of Staff Vehicles in PM	**4** (0 in, 4 out)	**4** (0 in, 4 out)	**10** (0 in, 10 out)	**0** (0 in, 0 out)	**6** (0 in, 6 out)

As shown in Table 36, the existing conditions have reached the maximum number of staff in Stage 1, this resulted in no increase in the number of vehicles generated between existing conditions and Stage 1. However, there will be an increase in the number of staff in Stage 2, resulting in 18 vehicles in AM peak and 10 vehicles in PM peak. This is an increase of 11 vehicles in the AM peak and 6 vehicles in PM peak from the current condition.

In summary, the approved GPS has the ability to generate the following additional traffic for students and staff:

- Stage 1: 142 vehicles (71 inbound, 71 outbound) during the AM and PM peak
- Stage 2: 421 vehicles (216 inbound, 205 outbound) during the AM peak
  416 vehicles (205 inbound, 211 outbound) during the PM peak

The additional traffic volumes for Stage 1 have been considered for the opening year 2028 scenario, while Stage 2 full capacity has been considered for the ultimate year 2038 scenario.

11.2.2 Liverpool Hospital and Academic Precinct (LHAP)

The recently completed Multi-Storey Car Park (MSCP), part of the approved Liverpool Hospital redevelopment, has its traffic generation already incorporated into the background traffic surveys.

[8] This figure is obtained from Section 6.1 of the New Liverpool Primary School Transport and Accessibility Impact Assessment

11.3 Trip Redistribution

11.3.1 Kiss and Drop Relocation - LBGHS Proposal

As discussed in Section 9 as part of the proposal, the existing K&R zone along the western side of Forbes Street is being relocated to the southern side of Lachlan Street (refer to Figure 37).

The relocation of the K&R zone to Lachlan Street will result in a redistribution of vehicles (i.e. parents now dropping students off along Lachlan Street rather than Forbes Street). For the purpose of this assessment, the above relocation has been included in the modelling for the opening year 2028 onwards.

As detailed in Section 9.1, the assumptions for redistribution of traffic have been based on based on our student location analysis, and our on-site observations. The proposed redistribution is detailed below and shown in for reference:

- 30% of vehicles will travel from the north via Hart Street
- 40% of vehicles will travel from the west via Lachlan Street
- 30% of vehicles will travel from the south via Goulburn Street.

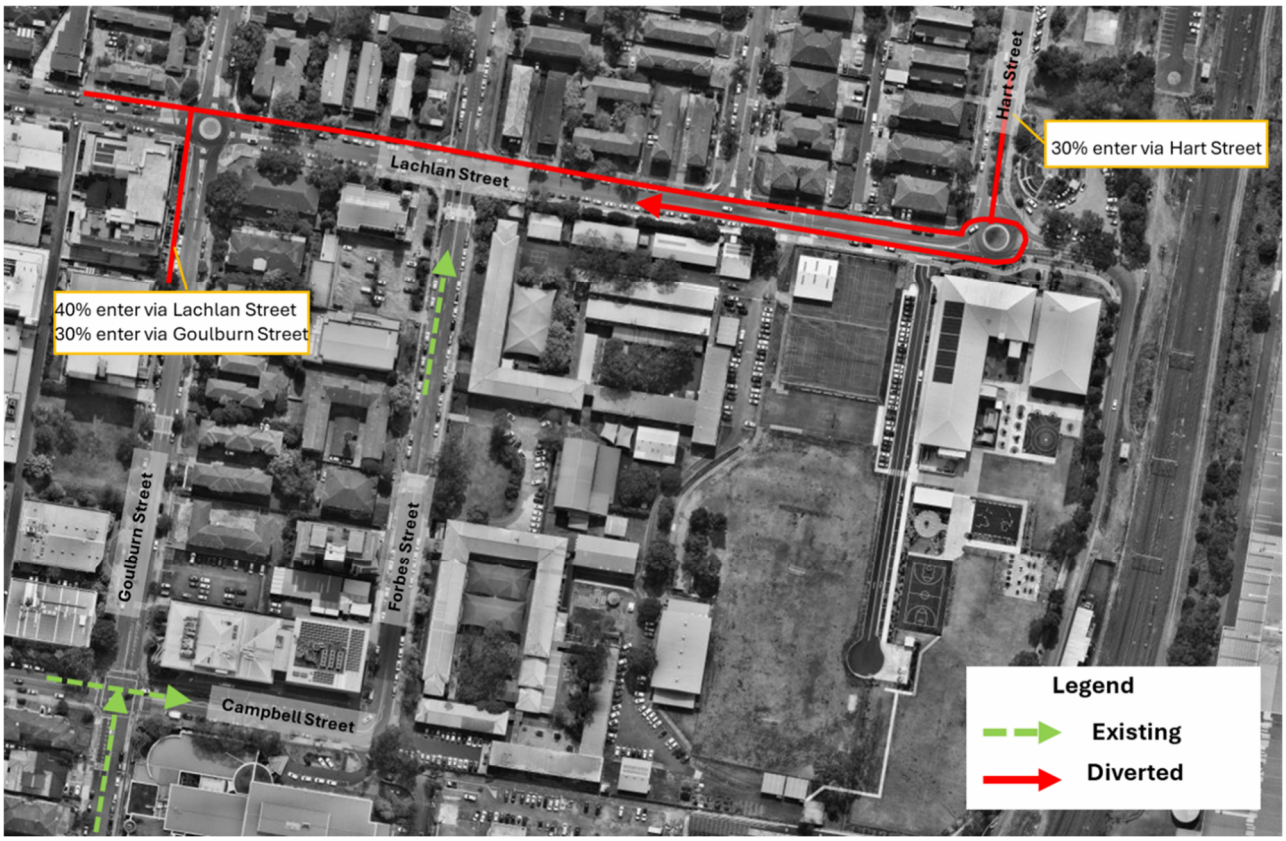


Figure 40: Kiss and Drop Relocation Redistribution

Figure 40 shows that vehicles which previously utilised the K&R zone on Forbes Street will now travel to the site via either Hart Street, Lachlan Street (west) or Goulburn Street (south). Refer to Section 9.1 for the detailed distribution analysis.

The above K&R relocation redistributions have been incorporated in the modelling for the opening year 2028 onwards.

11.3.2 Lachlan Street / Forbes Street Reverse Priority - Liverpool Hospital Redevelopment

As part of the approved Liverpool Hospital Redevelopment (SSD 10389) reversal of the existing priority at the Lachlan Street / Forbes Street intersection to enhance its performance is required. Reference can be made to *Liverpool Health and Academic Precinct Transport and Accessibility Impact Assessment SSD10389 (Stantec, May 2020)*, for further details. The existing and proposed sign control changes are included below in Figure 41.

It is also noteworthy to mention, reviewing the existing traffic count surveys which were completed in August 2024 as part of the LBGHS project, vehicles volumes along Lachlan Street are greater (+~100 vehicles in the AM peak & +400 vehicles in the PM peak) when compared to Forbes Street, therefore further justifying the priority reversal at this intersection. It is intended this proposal will be implemented prior to occupation of LBGHS.

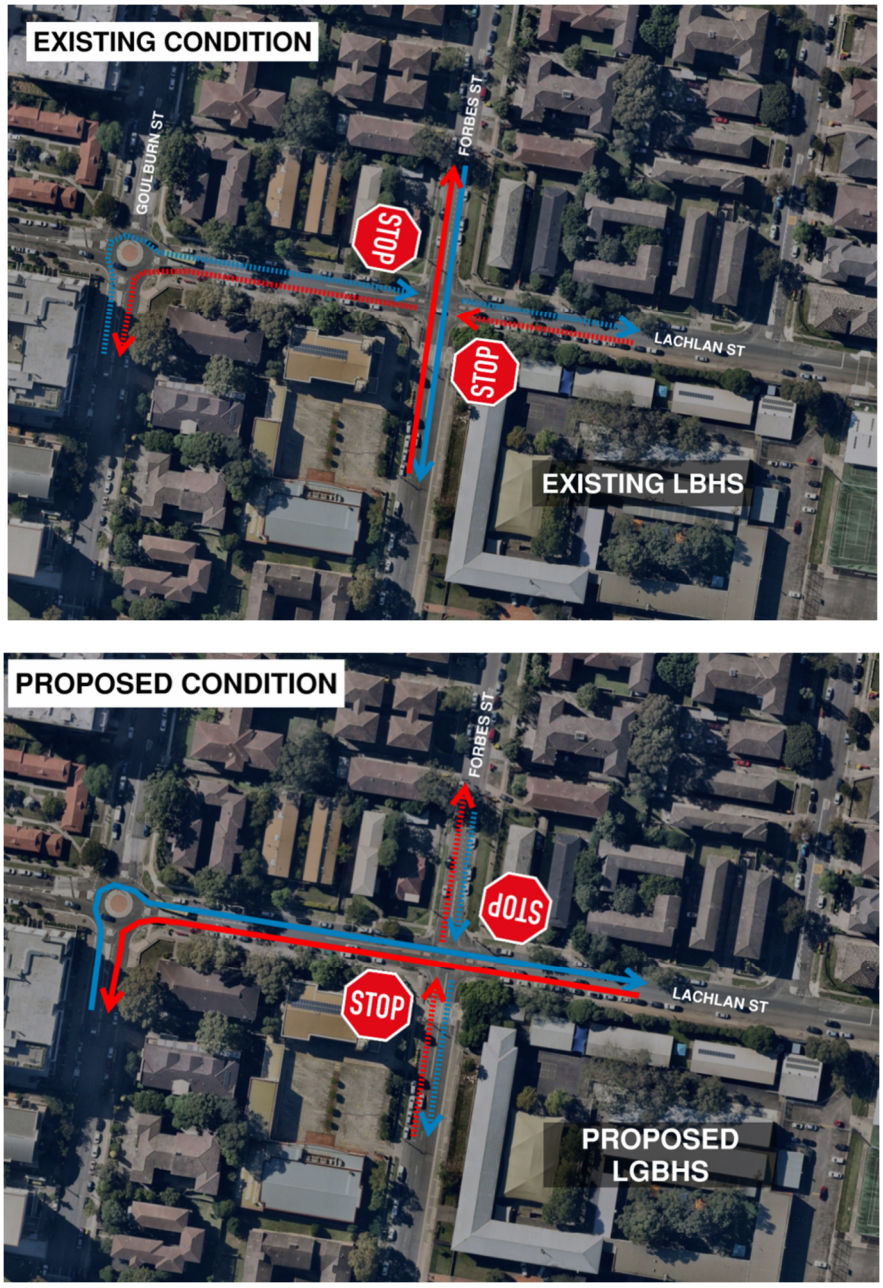


Figure 41: Existing and Proposed Sign Control Reversal

This adjustment has been incorporated into the modelling from the opening year, 2028, onwards.

11.3.3 Lachlan Street / Forbes Right Turn Restrictions – GPS Stage 2

As part of the approved GPS project (SSD 10391) the Forbes Street / Lachlan Street intersection is required to be restricted to left-in/left-out (LILO) movements when GPS reaches its final capacity of 1,280 students in Stage 2. Reference can be made to *New Liverpool Public School Transport and Accessibility Impact Assessment (Stantec, June 2021)*, for further details. The proposed sign control changes and redistribution are included below in Figure 42 to Figure 45.

Figure 42: No Right Turn Implemented

Figure 43: North Approach Redistribution

Figure 44: South Approach Redistribution

Figure 45: East Approach Redistribution

Source: Liverpool Boys and Girls High Schools Transport Concept Design (Stantec, 2023)

As shown above, once the right turn restrictions are implemented the vehicles approaching from the north on Forbes Street are expected to divert through Drummond Lane and Drummond Street to access Lachlan Street. Vehicles approaching from the east on Lachlan Street are expected to turn right on Drummond Street to access Forbes Street.

It is noteworthy to mention, the delivery of the left-in/left-out intersection improvements are not required until the GPS reaches its final capacity of 1,280 students in Stage 2. SINSW have confirmed enrolment projects forecast reaching this capacity may be within 10 years. For the purpose of this assessment, these improvements have therefore only been included in the ultimate year 2038 modelling.

11.3.4 Campbell Street Closure

As part of the approved Liverpool Hospital Redevelopment (SSD 10389), Campbell Street was proposed to be closed to vehicles between Goulburn Street and Forbes Street. Council confirmed at the TWG in September 2024, the proposed closure is not supported by Council at this stage. Council confirmed to disregard the proposal as part of the LBGHS redevelopment. The traffic analysis assessment will therefore exclude the proposed Campbell Street closure.

11.3.5 Summary

In summary the below trip redistributions have been incorporated into the following modelling scenarios:

- 2028 Opening Year onwards: Traffic redistribution due to LBGHS K&R relocation
  Reverse priority of Lachlan Street / Forbes Street
- 2038 Ultimate Year: Lachlan Street / Forbes Right Turn Restrictions

11.4 Scope of Modelling

Whilst the proposed LBGHS intends to have a minimal impact on existing and future road network given the site currently accommodates 2 existing schools, traffic modelling has been completed to ensure a robust assessment has been undertaken.

The scope of traffic modelling studies is shown in Figure 46. This involves analysis of 5 intersections within close proximity of the site. As detailed in Section 2.7 intersection movement count surveys have been undertaken at each of these intersections.

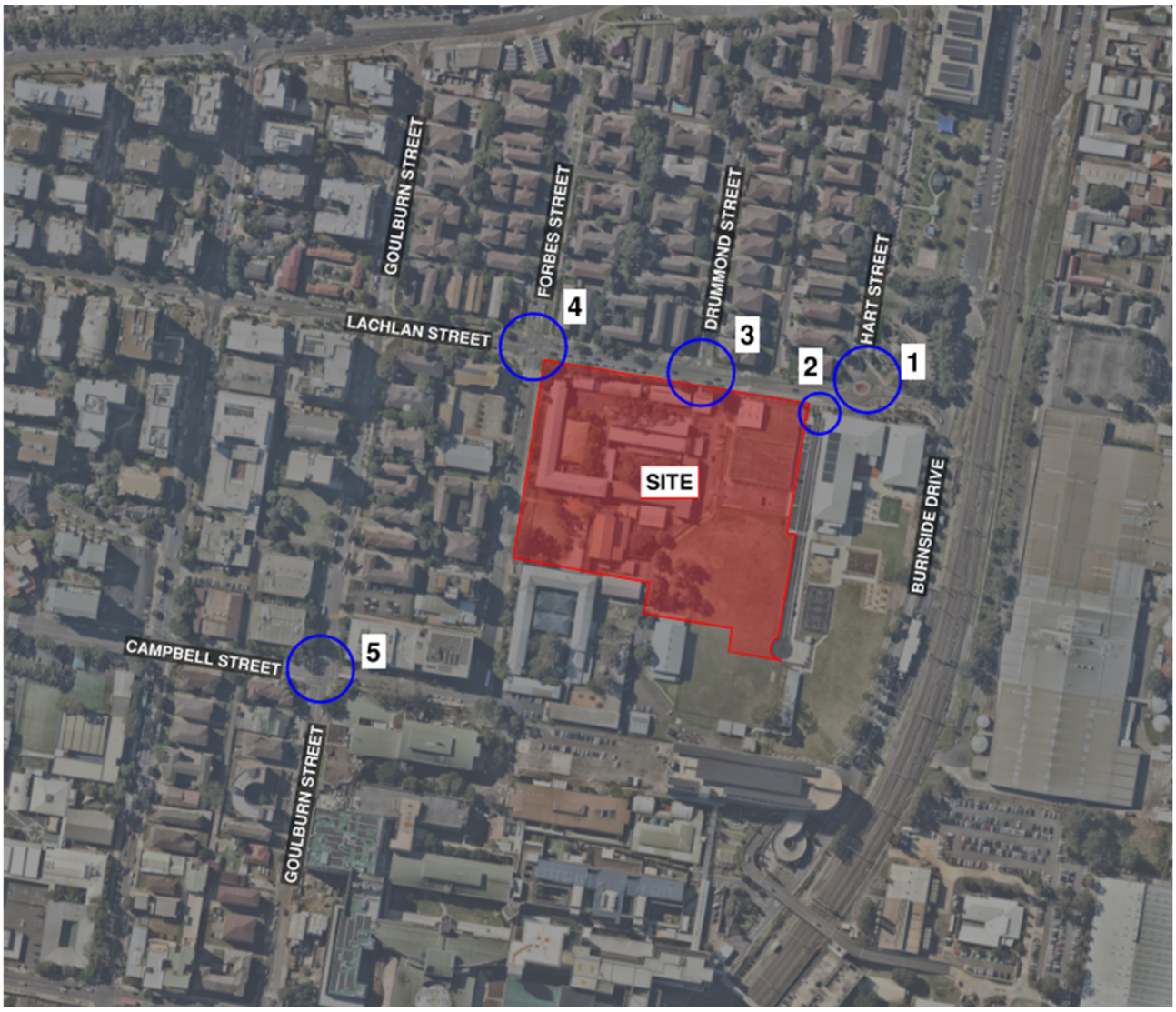


Figure 46: Scope of Traffic Data Collection
Source: Modified from Nearmap

The operation of all surveyed intersections was evaluated using SIDRA Intersection v9.1. This allows evaluation of the road network performance and operational issues at the intersection level. The results include degree of saturation, level of service and queue lengths. The intersections along Lachlan Street were modelled in a network, while the Campbell Street / Goulburn Street intersection was modelled as an individual site. The existing layouts are shown in Figure 47.

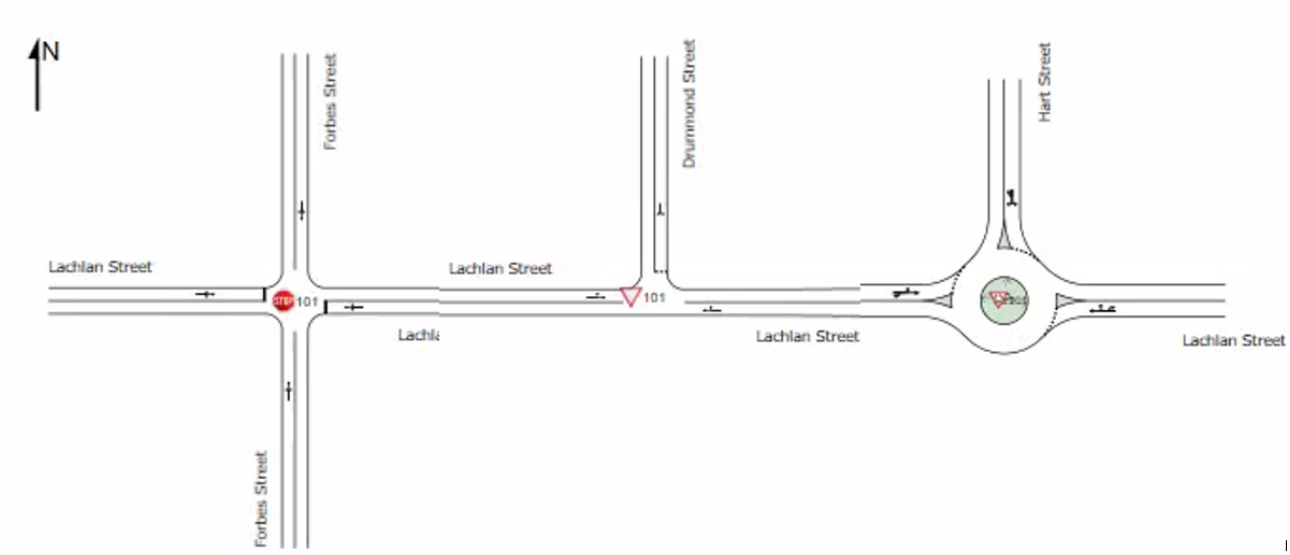


Figure 47: Lachlan Street Intersection Layouts

Figure 48 shows the existing layout of the Campbell Street / Goulburn Street Intersection. This intersection was excluded from the above network as it is considered too far from the other modelled intersections to operate as a network.

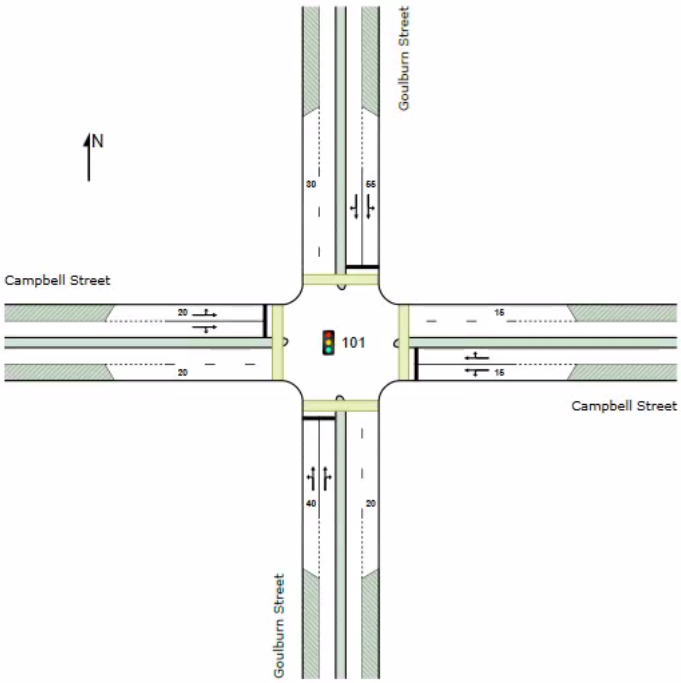


Figure 48: Campbell Street / Goulburn Street Intersection Layout

11.5 Modelling Methodology

11.5.1 Traffic Volumes

As previously mentioned in Section 2.7, traffic surveys were commissioned on 1 August 2024 (during the school term). The data was analysed to determine the network peak hour for each of the AM and PM peak periods. AM peak hours of **7:30am to 8:30am** and PM peak hours of **3:15pm to 4:15pm** have been adopted for this assessment.

11.5.2 Traffic Signal Data

The SCATS data provided by TfNSW includes the SCATS history file for 1 August 2024 (same days as the traffic surveys) which shows the phase frequencies and timing per fifteen-minute intervals for the Campbell Street / Goulburn Street signalised intersection.

11.5.3 Assessment Years

The SIDRA models were prepared for the base year 2024, opening year 2028 and a 10-year horizon year 2038.

11.5.4 Background Traffic Growth

In reviewing the surrounding land uses near the site, it is expected that traffic growth would primarily result from a new significant development or intensification of the hospital (captured in the cumulative assessment in Section 1.1). Nearby residential developments are already developed (high-density residential development). On this basis no background traffic growth has been applied to the model.

This methodology aligns with the approved traffic reports completed for Liverpool Hospital Redevelopment (SSD 10389) and GPS (SSD 10391).

11.5.5 Modelling Scenarios

The following modelling scenarios were developed for the assessment and listed in Table 37.

Table 37: Intersection Modelling Scenarios

No	Scenario	Description
1	Existing Condition	Existing 2024 traffic surveys
2	2028 Opening Year	Scenario 1, plus: ▪ Relocation of the K&R zone for LBGHS to the southern side of Lachlan Street. ▪ Allowance for Stage 1 maximum capacity of GPS as part of the GPS approval (SSD 10391) ▪ Reverse priority of Lachlan Street / Forbes Street as part of the LHR (SSD 10389)
3	2038 Ultimate Year	Scenario 2, plus: ▪ Maximum capacity for LBGHS ▪ Stage 2 maximum capacity of GPS as part of the GPS approval (SSD10391) ▪ Lachlan Street / Forbes right-turn restrictions as part of the GPS approval (SSD–10391)
3a	2038 Ultimate Year (with Mitigation)	Scenario 3 plus: ▪ Mitigation measure of a right-turn restriction for the southern leg at the Lachlan Street / Forbes Street intersection
4	Sensitivity test (Inclusion of GPS access)	Scenario 1 plus: ▪ Inclusion of the existing GPS vehicle access plus the proposed LBGHS traffic existing from the proposed staff car park. Assuming full (100%) occupancy.

As shown above in Table 37, Scenario 2, 3 and 3a incorporate intersection upgrades and additional traffic as a result of the GPS approved development (GPS SSD 1039, Condition D7 & D7A). This approach was considered the most conservative approach to ensure all approved external works would be captured as part of our traffic assessment.

11.6 Modelling Calibration

The SIDRA base models have been validated by reviewing the modelled queue lengths against on-site queue length observations. Site observations of the morning and afternoon peak periods were undertaken on the same day as the intersection movement counts for consistency. The typical and maximum queues were recorded at each intersection, which represent the average and 95th percentile queues in SIDRA, respectively. Interrogation of the SIDRA outputs indicates that the model accurately reflects the observed on-site queues for the same day and peak period.

SCATS signal information has been obtained from TfNSW to assist with coding the Campbell Street / Goulburn Street intersection. SIDRA calculated cycle time/ phase times were calibrated to align with the SCATS cycle time/ phase times. In addition, pedestrian protections were coded at the signalised intersection in accordance with existing conditions.

11.7 Traffic Modelling Results

11.7.1 Interpretation of Modelling Results

The commonly used measure of intersection performance, as defined by Transport for NSW, is vehicle delay. SIDRA Intersection determines the average delay that vehicles encounter and provides a measure of the level of service. Level of Service of A-D is generally considered acceptable operation.

Table 38 shows the criteria that SIDRA Intersection adopts in assessing the level of service.

Table 38: SIDRA Level of Service Criteria

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but crash study required
D	43 to 56	Near capacity	Near capacity, crash study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

11.7.2 Existing Scenario (Scenario 1)

As described in Table 37 the scenario considers the following:

- Existing 2024 traffic surveys

Table 39 presents a summary of the existing operation of the key intersections during both peak periods.

Table 39: Scenario 1 Operating Conditions

Intersection	Control	Peak Hour	Degree of Saturation	Average Delay (sec)	95th% Queue (metres)	Level of Service
Lachlan Street / Burnside Drive / Hart Street	Roundabout	AM	0.380	10.8	17.6	A
		PM	0.144	7.7	5.4	A
Lachlan Street / Drummond Street	Priority	AM	0.103	8.9	2.4	A
		PM	0.031	7.2	0.7	A
Lachlan Street / Forbes Street	Priority	AM	0.612	28.8	68.1	C
		PM	0.242	21.4	7.4	B
Goulburn Street / Campbell Street	Signalised	AM	0.611	23.4	52.9	B
		PM	0.514	22	32.6	B

The modelling results show that under existing conditions all the intersections assessed operate well, with a LoS C or better in the AM and PM peak periods which indicates that the intersections are operating satisfactorily or have spare capacity. It is noteworthy to mention the Lachlan Street / Forbes Street intersection has a queue of 68 metres this is primarily due to vehicles having to give way to vehicles on Forbes Street.

11.7.3 Opening Year 2028 (Scenario 2)

As described in Table 37, the scenario considers:

- Relocation of the kiss-and-drop zone to the southern side of Lachlan Street
- Existing traffic generated by the LBGHS is redistributed to Lachlan Street
- Reversal of priority at the Lachlan Street / Forbes Street intersection
- Traffic generated by the GPS development at Stage 1 capacity

Table 40 presents a summary of the expected future operation of the intersections.

Table 40: Scenario 2 Operating Conditions

Intersection	Control	Peak Hour	Degree of Saturation	Average Delay (sec)	95th% Queue (metres)	Level of Service
Lachlan Street / Burnside Drive / Hart Street	Roundabout	AM	0.464	12.8	24.3	A
		PM	0.493	10.1	25.4	A
Lachlan Street / Drummond Street	Priority	AM	0.393	12.7	3.1	A
		PM	0.045	10	1.0	A
Lachlan Street / Forbes Street	Priority	AM	0.954	54.8	91.8	D
		PM	0.198	18.7	4.7	B
Goulburn Street / Campbell Street	Signalised	AM	0.553	21.8	49.4	B
		PM	0.467	21.6	31.6	B

Based on the modelling results the following is observed:

- The intersection of Forbes Street and Lachlan Street operates near capacity with a LoS D during the AM peak and LoS B during the PM peak. However, it is noted that the DoS remains below 1 in the AM peak, indicating some available capacity at this intersection. This LoS D is a result of the right-turning vehicles from Forbes Street's southern approach onto Lachlan Street.
- All other assessed intersections operate at a maximum LoS B or better during both the AM and PM peak periods, signifying that these intersections are performing satisfactorily.

11.7.4 Ultimate Year 2038 (Scenario 3)

As described in Table 37, the scenario considers:

- Relocation of the kiss-and-drop zone to the southern side of Lachlan Street.
- Existing traffic generated by LBGHS in the opening year is redistributed to Lachlan Street
- Additional traffic generated by LBGHS in the full development with a baseline scenario mode split is included
- Priority reversal at the Lachlan Street / Forbes Street intersection
- Traffic generated by GPS development at Stage 2 capacity.
- Proposed left-in / left-out measure at the northern approach of Lachlan Street / Forbes Street intersection as a part of the GPS approval

Table 41 presents a summary of the expected future operation of the intersections.

Table 41: Scenario 3 Operating Conditions

Intersection	Control	Peak Hour	Degree of Saturation	Average Delay (sec)	95th% Queue (metres)	Level of Service
Lachlan Street / Burnside Drive / Hart Street	Roundabout	AM	0.712	21.8	58.5	B
		PM	0.685	19.1	53.8	B
Lachlan Street / Drummond Street	Priority	AM	0.517	26.3	13.7	B
		PM	0.530	37.7	12	C
Lachlan Street / Forbes Street	Priority	AM	2.207	1130.5	789.3	F
		PM	0.477	58.7	10.9	E
Goulburn Street / Campbell Street	Signalised	AM	0.612	21.8	59.1	B
		PM	0.514	21.8	32.6	B

Based on the modelling results the following is observed:

- The intersection of Lachlan Street/ Forbes Street deteriorates to LoS F in the AM peak hours. The southern approach had the worst movement, and the worst performing movement was the right turning movement as being a priority-controlled intersection, right-turning vehicles must give way to the through movement at Lachlan Street.
- All other assessed intersections operate at a maximum LoS B or better during both the AM and PM peak periods, signifying that these intersections are performing satisfactorily or have spare capacity.

It's also noteworthy to mention, whilst GPS Stage 2 is approved it is not funded and there is a likelihood it may not be delivered by 2038. A test scenario was completed, excluding GPS Stage 2 additional traffic to confirm the impact of LBGHS on the 2038 road network. The results of this scenario showed similar results to the above, noting that Lachlan Street / Forbes Street would operate at a LoS F in the AM and E in the PM peak hours.

11.7.5 Ultimate Year 2038 with mitigation measure (Scenario 3a)

As described in Table 37, the scenario considers:

- Relocation of the kiss-and-drop zone to the southern side of Lachlan Street.
- Existing traffic generated by LBGHS in the opening year is redistributed to Lachlan Street
- Additional traffic generated by LBGHS in the full development with a baseline scenario mode split is included
- Priority reversal at the Lachlan Street / Forbes Street intersection.
- Traffic generated by the GPS development at Stage 2 capacity
- Proposed left-in / left-out restriction at the Lachlan Street / Forbes Street intersection
- A mitigation measure to reduce the congestion at the Lachlan Street / Forbes Street intersection in Scenario 3 (Ultimate Year 2038) by implementing a right-turn ban for the southern approach of Forbes Street

Table 42 presents a summary of the expected future operation of the intersections.

Table 42: Scenario 3a Operating Conditions

Intersection	Control	Peak Hour	Degree of Saturation	Average Delay (sec)	95th% Queue (metres)	Level of Service
Lachlan Street / Burnside Drive / Hart Street	Roundabout	AM	0.622	16.4	43.6	B
		PM	0.681	19	53.2	B
Lachlan Street / Drummond Street	Priority	AM	0.433	21.3	11.4	B
		PM	0.497	34.6	11.2	C
Lachlan Street / Forbes Street	Priority	AM	0.035	11.4	0.8	A
		PM	0.405	22.1	14.2	B
Goulburn Street / Campbell Street	Signalised	AM	0.564	21.8	52.7	B
		PM	0.514	21.8	32.6	B

Based on the modelling results the following is observed:

- Inclusion of a right turn ban to the Lachlan Street / Forbes Street intersection for the south approach improves the operation of the intersection from LoS F in AM (Ultimate Year 2038 scenario 3 shown in Table 40) to LoS A in AM
- The results indicate even completing an extremely conservative assessment by applying the baseline travel modes 28% for students and 93% for staff the surrounding intersections have sufficient capacity to accommodate additional vehicle during the peak periods.
- With the exception of Lachlan Street / Forbes Street, generally, all other intersections would operate at similar levels of services compared to the Base Scenario, the proposed LBGHS development is therefore considered to have a minimal impact on the surrounding external road network.

11.7.6 Sensitivity Test - Inclusion of GPS Access (Scenario 4)

As described in Table 30 the scenario considers the following:

- Existing 2024 Traffic Surveys
- Inclusion of GPS vehicle access onto the Lachlan Street network model
- Additional traffic generated by 112 car parking spaces with shared access via GPS, designated for LBGHS staff, assuming full (100%) occupancy.
- A sensitivity test to Scenario 1. Priority reversal and any restrictions are **not** adopted in this model.

Table 43 presents a summary of the expected operation of the intersections.

Table 43: Scenario 4 Operating Conditions

Intersection	Control	Peak Hour	Degree of Saturation	Average Delay (sec)	95th% Queue (metres)	Level of Service
Lachlan Street / Burnside Drive / Hart Street	Roundabout	AM	0.529	12.4	30.8	A
		PM	0.094	7.4	3.4	A
Lachlan Street / GPS Access	Priority	AM	0.02	5.9	0.6	A
		PM	0.128	7.4	3.5	A
Lachlan Street / Drummond Street	Priority	AM	0.103	8.9	2.4	A
		PM	0.037	8.4	0.8	A
Lachlan Street / Forbes Street	Priority	AM	0.612	28.8	68.1	C
		PM	0.272	28.2	8.3	B

The modelling results for the sensitivity test indicate the following:

- Inclusion of GPS vehicle access onto the Lachlan Street network has no material impact on the external road network, with outcomes consistent with existing conditions (Scenario 1). The left-in access supports free-flowing traffic with minimal conflict from other movements. Previously observed queuing back to the Lachlan Street/Hart Street roundabout was linked to gate closures at the GPS access point; however, recent site observations confirm that the gates are now kept open, 30 minutes before school pick-up and drop-off resulting in free-flowing traffic with no queue spillback, aligning with the modelling results.

11.7.7 Intersection Performance Summary

Based on the scenarios tested, the summary of LoS results is shown in Table 44 below.

Table 44: Intersection Performance Summary

Scenario	Peak Hour	Lachlan Street / Burnside Drive / Hart Street	Lachlan Street / Drummond Street	Lachlan Street / Forbes Street	Goulburn Street / Campbell Street
Scenario 1	AM	A	A	C	B
	PM	A	A	B	B
Scenario 2	AM	A	A	D	B
	PM	A	A	B	B
Scenario 3	AM	B	B	F	B
	PM	B	C	E	B
	Mitigation Measures to Scenario 3				
Scenario 3a	AM	B	B	A	B
	PM	B	C	B	B
	Sensitivity Test to Scenario 1				
Scenario 4	AM	A	A	C	-
	PM	A	A	B	-

The modelling results indicate the following:

- With the exception of Lachlan Street / Forbes Street, generally, all other intersections would operate at similar levels of services compared to the Base Scenario, the proposed LBGHS development is therefore considered to have a minimal impact on the surrounding external road network.
- Additional development traffic associated with LBGHS in 2038 (Scenario 3) resulted in the Lachlan Street / Forbes Street intersection operating as a LoS F in the AM and E in the PM. This shows the intersection is at capacity and mitigation measures need to be implemented to improve the performance of this intersection.
- As a mitigation measure to improve the operation from LoS F in the AM peak, a right-turn ban on the southern approach of Forbes Street is proposed. As shown in the modelling result under Scenario 3a, the restriction improves its performance, with the intersection operating satisfactorily at LoS A in the AM and B in the PM peaks.
- Modelling results for scenario 4 indicate that the inclusion of GPS access onto the Lachlan Street network has no material impact on the external road network, with outcomes consistent with existing conditions (Scenario 1).

In summary, the traffic modelling indicates the proposed LBGHS development will have a minimal impact on the surrounding external road network. The proposal can therefore be supported from a traffic and transport perspective. Providing the following mitigation measures are implemented:

2028 Opening Year – Prior to Occupation

- Priority reversal at the Lachlan Street / Forbes Street intersection.

2 Years after Occupation

- Left-in / left-out restriction at the Lachlan Street / Forbes Street intersection
- Right-turn ban for the southern approach of Forbes Street at the Lachlan Street / Forbes Street intersection

Section 12 Mitigation Measures

An overall summary is provided below to outline the infrastructure upgrades and operational measures to be implemented as part of this REF to mitigate its impacts. All mitigation measures listed have been included in the design proposal for this REF; no measures need to be further integrated.

Table 45: Mitigation Measures

Project Stage	Mitigation Measures	Section Reference
Design	**Infrastructure Upgrades / On-site Provisions** ▪ A reversal of priority at the Lachlan Street / Forbes Street intersection ▪ Provision of 200 on-site bicycle parking spaces for students plus 22 bicycle parking spaces for staff, along with change rooms, showers, and lockers to act as end-of-trip facilities (EOTF) for staff; and ▪ Provision of 112 on-site car parking spaces for staff, including 2 accessible parking spaces in accordance with LDCP, Part 4 ▪ The relocation of the existing 78 metre K&R area on Forbes Street to the southern side of Lachlan Street to provide a dedicated 68 metre new K&R Zone. The new K&R will also include an existing 30 metre K&R zone along the southern side of Lachlan Street. ▪ Provision of 2 on-site servicing / waste collection areas that can accommodate a maximum of 10.5m waste truck and 1 on-street loading bay that can accommodate 12 metre MRV. ▪ All off site works will be constructed prior to the commencement of any occupation at the school. Infrastructure upgrade measures have been developed based on consultation with both Council and TfNSW since September 2024, and has evolved over time in response to feedback received.	Proposed Work – Section 3 Traffic Modelling Results – Section 11.7.3 Cyclist access & facilities – Section 6 Vehicular access – 10.5.1 Parking facilities – 10.2 Drop-off and pick-up zones – 0 Bus bays – 0 Service vehicles – Section 8 Swept path analysis – Appendix C

Project Stage	Mitigation Measures	Section Reference
Operation	Implementation of a School Transport Plan (noting a Preliminary version has been prepared by TTW and submitted separately with this REF), which may include measures such as: ▪ Regular communication and reminders to the school community ▪ Regular data collection and monitoring of transport strategy progress ▪ Publishing a Travel Access Guide ▪ A Travel Coordinator will be engaged for the first 12 months of operation to implement the School Transport Plan; and ▪ Maintaining a governance framework between SINSW, Council, and TfNSW. ▪ Seeking additional bus services to the site, through coordination of enrolment and depersonalised location data with Transport for NSW on an ongoing basis. All operational mitigation measures would be implemented on starting from the opening year. It is anticipated that the School Transport Plan will be updated on an annual basis.	Refer to School Transport Plan (lodged separately with this REF)
Design/ Operation	Bus service (819 service) is proposed to be re-routed with a proposed stop outside LGBHS. This will provide additional bus services for students living within the north-west portion of the site. Alterations to the 819 will be further discussed and coordinated with TfNSW.	Bus Service Proposal – Section 7.2.1and Refer to School Transport Plan (lodged separately with this REF)
Design / Operation	Proposed left-in / left-out restriction at the Lachlan Street / Forbes Street intersection, along with a recommended right-turn ban for the southern approach. This is to be implemented 2 years after occupancy of LBGHS, in the case GPS Stage 2 is not completed.	Traffic Modelling Results – Section 11.7.5

Section 13 Conclusion

The overall transport strategy for the proposed new co-educational high school in Liverpool city centre is as follows:

- Provide a sustainable transport strategy, prioritising active and public transport and discouraging travel by private vehicle;
- Encourage and facilitate pedestrian movements within a walkable local catchment through provision of infrastructure such as pedestrian crossings and safety devices such as pedestrian fencing;
- Encourage and facilitate cyclist movements across the wider catchment by connecting to existing dedicated bike lanes (and maintaining these for public usage) and providing on-site facilities for both students and staff;
- Encourage and facilitate public transport activity by providing additional capacity to bus zones along Buchan Avenue, and working with TfNSW to provide additional routes and services for the growing school population over time;
- Accommodate service vehicles on the site with a dedicated on-site loading dock for vehicles up to 10.5m waste truck, separated from the staff car park and pedestrian areas;
- Facilitate kiss & ride activity while discouraging its uptake, with provision of multiple kiss & ride zones to distribute traffic and associated footpath infrastructure for high intensity areas, and implement a School Transport Plan to encourage and advertise the range of alternative transport options available; and
- Facilitate car parking activity while discouraging its uptake, with provision of on-site car parking for 50% of staff when the school is at full capacity, achieving a shift from higher initial usage to this lower percentage usage over time, in parallel to the growth of the student and staff population at the school.

This overall strategy has been proposed to and discussed with both Council and TfNSW during ongoing project liaison through a Transport Working Group for the project. A meeting has been held with these authorities in September 2024, and the project has refined the transport strategy during that period in response to feedback received.

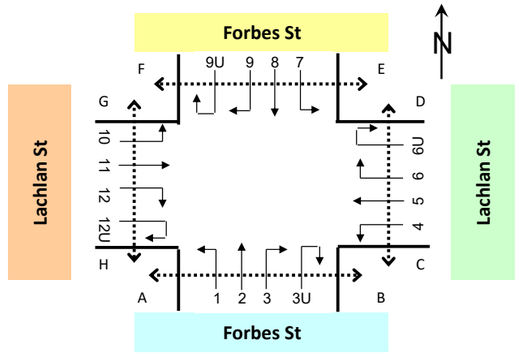
Overall, the transport provisions of this project across all travel modes have been selected and developed in order to provide a sustainable, safe, and efficient site. These provisions include physical infrastructure works on- and off-site, along with management measures to be implemented during operation of the school. While school sites generate significant volumes of travel demand in short periods of time, the proposed transport strategy is considered an appropriate balance and is demonstrated to provide appropriate outcomes for the site.

Prepared by		Reviewed by	Approved by
TTW (NSW) PTY LTD	**TTW (NSW) PTY LTD**	**TTW (NSW) PTY LTD**	**TTW (NSW) PTY LTD**
			
MICHAEL PARTADINATA	**SABAL SHARMA**	**MARIA MULHOLLAND**	**MICHAEL BABBAGE**
Traffic Engineer	Traffic Engineer	Senior Traffic Engineer	Associate (Traffic)

Appendix A Traffic Volume Data

Job No. : AUNSW10178
Client : TTW (Taylor Thomson Whitting) (NSW) Pty Ltd
Suburb : Liverpool
Location : 1. Lachlan St / Forbes St

Day/Date : Thursday, 1 August 2024
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



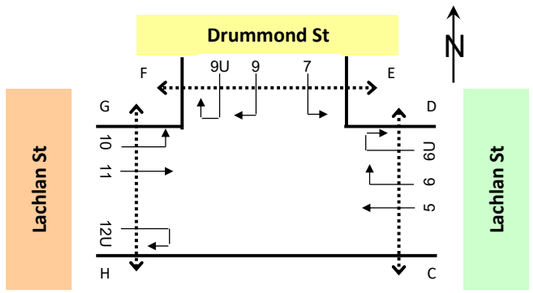
MATRIX Traffic and Transport Data

	Approach	Forbes St				Lachlan St				Forbes St				Lachlan St				Grand Total
	Time Period	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	
AM	7:30 to 8:30	410	1	1	**412**	171	0	0	**171**	78	0	1	**79**	377	1	9	**387**	**1,049**
PM	15:15 to 16:15	145	0	0	**145**	492	1	0	**493**	61	1	1	**63**	164	1	9	**174**	**875**

	Approach	Forbes St				Lachlan St				Forbes St				Lachlan St				Grand Total
	Time Period	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	
	7:00 to 8:00	391	1	0	**392**	160	2	0	**162**	70	0	1	**71**	334	2	1	**337**	**962**
	7:15 to 8:15	412	1	0	**413**	176	1	0	**177**	72	0	1	**73**	357	2	4	**363**	**1,026**
	7:30 to 8:30	410	1	1	**412**	171	0	0	**171**	78	0	1	**79**	377	1	9	**387**	**1,049**
	7:45 to 8:45	369	1	1	**371**	169	1	0	**170**	90	0	0	**90**	382	0	13	**395**	**1,026**
	8:00 to 9:00	316	0	1	**317**	161	2	0	**163**	89	0	0	**89**	327	1	15	**343**	**912**
	8:15 to 9:15	280	2	2	**284**	161	3	0	**164**	84	0	0	**84**	303	1	12	**316**	**848**
	8:30 to 9:30	236	2	1	**239**	160	3	0	**163**	70	0	0	**70**	274	2	8	**284**	**756**
	8:45 to 9:45	219	2	1	**222**	139	3	0	**142**	57	0	0	**57**	241	4	3	**248**	**669**
	9:00 to 10:00	201	2	1	**204**	150	3	0	**153**	52	0	0	**52**	249	4	1	**254**	**663**
	AM Totals	**908**	**3**	**2**	**913**	**471**	**7**	**0**	**478**	**211**	**0**	**1**	**212**	**910**	**7**	**17**	**934**	**2,537**
	14:00 to 15:00	166	0	1	**167**	301	3	0	**304**	43	0	1	**44**	181	2	2	**185**	**700**
	14:15 to 15:15	193	0	0	**193**	300	2	0	**302**	58	0	1	**59**	186	3	4	**193**	**747**
	14:30 to 15:30	194	0	0	**194**	351	2	0	**353**	65	0	1	**66**	183	3	4	**190**	**803**
	14:45 to 15:45	190	0	0	**190**	359	1	0	**360**	65	0	0	**65**	177	2	13	**192**	**807**
	15:00 to 16:00	177	0	0	**177**	413	1	0	**414**	71	0	1	**72**	171	2	11	**184**	**847**
	15:15 to 16:15	145	0	0	**145**	492	1	0	**493**	61	1	1	**63**	164	1	9	**174**	**875**
	15:30 to 16:30	127	0	0	**127**	502	0	0	**502**	50	1	1	**52**	154	0	9	**163**	**844**
	15:45 to 16:45	98	0	0	**98**	527	1	0	**528**	49	1	1	**51**	154	0	0	**154**	**831**
	16:00 to 17:00	98	0	0	**98**	514	1	0	**515**	48	1	0	**49**	145	0	0	**145**	**807**
	16:15 to 17:15	89	0	0	**89**	521	2	0	**523**	55	0	0	**55**	142	1	0	**143**	**810**
	16:30 to 17:30	77	0	0	**77**	499	2	0	**501**	60	0	0	**60**	129	1	0	**130**	**768**
	16:45 to 17:45	79	0	0	**79**	458	1	0	**459**	54	0	0	**54**	133	1	0	**134**	**726**
	17:00 to 18:00	72	0	0	**72**	422	1	0	**423**	48	0	0	**48**	138	1	0	**139**	**682**
	PM Totals	**513**	**0**	**1**	**514**	**1,650**	**6**	**0**	**1,656**	**210**	**1**	**2**	**213**	**635**	**5**	**13**	**653**	**3,036**

Job No. : AUNSW10178
Client : TTW (Taylor Thomson Whitting) (NSW) Pty Ltd
Suburb : Liverpool
Location : 2. Lachlan St / Drummond St

Day/Date : Thursday, 1 August 2024
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



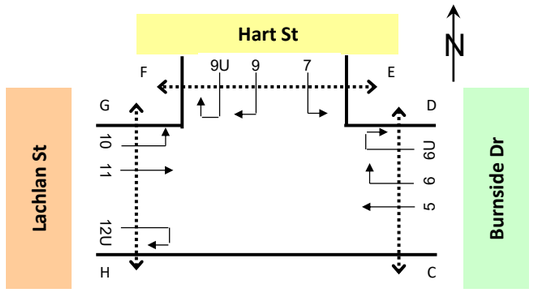
MATRIX Traffic and Transport Data

Approach		Lachlan St				Drummond St				Lachlan St				Grand Total
	Time Period	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	
AM	7:15 to 8:15	154	1	0	**155**	60	0	0	**60**	697	2	0	**699**	**914**
PM	15:15 to 16:15	502	1	0	**503**	21	0	0	**21**	207	1	0	**208**	**732**

Approach		Lachlan St				Drummond St				Lachlan St				Grand Total
	Time Period	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	
	7:00 to 8:00	139	2	0	**141**	50	0	0	**50**	675	2	0	**677**	**868**
	7:15 to 8:15	154	1	0	**155**	60	0	0	**60**	697	2	0	**699**	**914**
	7:30 to 8:30	154	0	0	**154**	63	0	0	**63**	676	2	0	**678**	**895**
	7:45 to 8:45	149	1	0	**150**	73	0	0	**73**	613	1	0	**614**	**837**
	8:00 to 9:00	139	2	0	**141**	66	0	0	**66**	480	1	0	**481**	**688**
	8:15 to 9:15	137	3	0	**140**	58	0	0	**58**	402	3	0	**405**	**603**
	8:30 to 9:30	126	3	0	**129**	53	0	0	**53**	343	4	0	**347**	**529**
	8:45 to 9:45	112	3	0	**115**	41	0	0	**41**	312	5	0	**317**	**473**
	9:00 to 10:00	121	3	0	**124**	49	0	0	**49**	314	5	0	**319**	**492**
AM Totals		**399**	**7**	**0**	**406**	**165**	**0**	**0**	**165**	**1,469**	**8**	**0**	**1,477**	**2,048**
	14:00 to 15:00	278	2	0	**280**	37	1	0	**38**	237	1	1	**239**	**557**
	14:15 to 15:15	305	1	0	**306**	34	1	0	**35**	228	2	0	**230**	**571**
	14:30 to 15:30	361	1	0	**362**	33	1	0	**34**	221	2	0	**223**	**619**
	14:45 to 15:45	389	1	0	**390**	31	0	0	**31**	214	2	0	**216**	**637**
	15:00 to 16:00	444	1	0	**445**	28	0	0	**28**	206	2	0	**208**	**681**
	15:15 to 16:15	502	1	0	**503**	21	0	0	**21**	207	1	0	**208**	**732**
	15:30 to 16:30	516	0	0	**516**	17	0	0	**17**	191	0	0	**191**	**724**
	15:45 to 16:45	514	1	0	**515**	23	0	0	**23**	171	0	0	**171**	**709**
	16:00 to 17:00	497	1	0	**498**	20	0	0	**20**	167	0	0	**167**	**685**
	16:15 to 17:15	493	3	0	**496**	29	0	0	**29**	167	1	0	**168**	**693**
	16:30 to 17:30	470	3	0	**473**	31	0	0	**31**	158	1	0	**159**	**663**
	16:45 to 17:45	424	2	0	**426**	31	0	0	**31**	162	1	0	**163**	**620**
	17:00 to 18:00	383	2	0	**385**	41	0	0	**41**	152	1	0	**153**	**579**
PM Totals		**1,602**	**6**	**0**	**1,608**	**126**	**1**	**0**	**127**	**762**	**4**	**1**	**767**	**2,502**

Job No. : AUNSW10178
Client : TTW (Taylor Thomson Whitting) (NSW) Pty Ltd
Suburb : Liverpool
Location : 3. Lachlan St / Hart St / Burnside Dr

Day/Date : Thursday, 1 August 2024
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



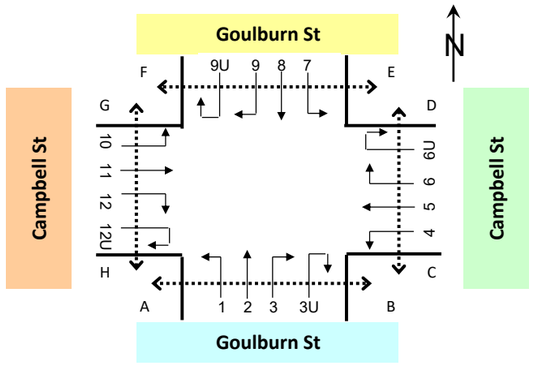
MATRIX Traffic and Transport Data

	Approach		Burnside Dr				Hart St				Lachlan St				Grand Total
	Time Period		Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	
AM	7:15	8:15	147	2	0	**149**	285	0	0	**285**	634	2	0	**636**	**1,070**
PM	16:15	17:15	604	2	0	**606**	111	0	0	**111**	123	1	0	**124**	**841**

Time Period															
7:00	to	8:00	145	2	0	**147**	257	1	0	**258**	610	2	0	**612**	**1,017**
7:15	to	8:15	147	2	0	**149**	285	0	0	**285**	634	2	0	**636**	**1,070**
7:30	to	8:30	122	1	0	**123**	293	0	0	**293**	602	2	0	**604**	**1,020**
7:45	to	8:45	92	1	0	**93**	278	0	0	**278**	533	1	0	**534**	**905**
8:00	to	9:00	72	2	0	**74**	240	1	0	**241**	404	1	0	**405**	**720**
8:15	to	9:15	85	4	0	**89**	228	1	0	**229**	333	3	0	**336**	**654**
8:30	to	9:30	104	4	0	**108**	182	1	0	**183**	298	4	0	**302**	**593**
8:45	to	9:45	108	4	0	**112**	139	1	0	**140**	275	5	0	**280**	**532**
9:00	to	10:00	120	4	0	**124**	143	0	0	**143**	279	5	0	**284**	**551**
AM Totals			**337**	**8**	**0**	**345**	**640**	**2**	**0**	**642**	**1,293**	**8**	**0**	**1,301**	**2,288**
14:00	to	15:00	269	1	0	**270**	105	0	0	**105**	195	2	1	**198**	**573**
14:15	to	15:15	291	0	0	**291**	101	1	0	**102**	179	1	0	**180**	**573**
14:30	to	15:30	346	0	0	**346**	96	1	0	**97**	167	2	0	**169**	**612**
14:45	to	15:45	398	0	0	**398**	98	1	0	**99**	158	2	0	**160**	**657**
15:00	to	16:00	444	0	0	**444**	104	1	0	**105**	154	2	0	**156**	**705**
15:15	to	16:15	515	0	0	**515**	106	0	0	**106**	149	2	0	**151**	**772**
15:30	to	16:30	558	0	0	**558**	106	0	0	**106**	140	0	0	**140**	**804**
15:45	to	16:45	599	1	0	**600**	105	0	0	**105**	126	0	0	**126**	**831**
16:00	to	17:00	607	1	0	**608**	106	0	0	**106**	115	0	0	**115**	**829**
16:15	to	17:15	604	2	0	**606**	111	0	0	**111**	123	1	0	**124**	**841**
16:30	to	17:30	575	2	0	**577**	123	1	0	**124**	115	1	0	**116**	**817**
16:45	to	17:45	500	1	0	**501**	128	1	0	**129**	123	1	0	**124**	**754**
17:00	to	18:00	450	1	0	**451**	123	1	0	**124**	122	1	0	**123**	**698**
PM Totals			**1,770**	**3**	**0**	**1,773**	**438**	**2**	**0**	**440**	**586**	**5**	**1**	**592**	**2,805**

Job No. : AUNSW10178
Client : TTW (Taylor Thomson Whitting) (NSW) Pty Ltd
Suburb : Liverpool
Location : 4. Campbell St / Goulburn St

Day/Date : Thursday, 1 August 2024
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



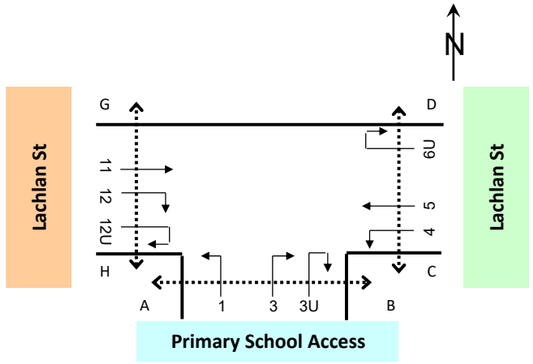
MATRIX Traffic and Transport Data

	Approach	Goulburn St				Campbell St				Goulburn St				Campbell St				Grand Total
	Time Period	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	
AM	7:45 to 8:45	351	1	1	**353**	189	1	14	**204**	125	1	3	**129**	287	1	3	**291**	**977**
PM	15:00 to 16:00	219	2	1	**222**	269	1	13	**283**	176	4	1	**181**	128	0	5	**133**	**819**

Approach	Goulburn St				Campbell St				Goulburn St				Campbell St				Grand Total
Time Period	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total	
7:00 to 8:00	330	3	0	**333**	127	1	2	**130**	81	0	3	**84**	219	1	2	**222**	**769**
7:15 to 8:15	353	2	0	**355**	144	1	5	**150**	97	0	3	**100**	248	1	4	**253**	**858**
7:30 to 8:30	357	1	1	**359**	155	1	8	**164**	119	1	3	**123**	280	1	4	**285**	**931**
7:45 to 8:45	351	1	1	**353**	189	1	14	**204**	125	1	3	**129**	287	1	3	**291**	**977**
8:00 to 9:00	321	2	1	**324**	209	2	14	**225**	132	1	2	**135**	261	0	3	**264**	**948**
8:15 to 9:15	300	3	2	**305**	221	3	12	**236**	133	1	2	**136**	238	0	2	**240**	**917**
8:30 to 9:30	284	2	1	**287**	212	3	9	**224**	124	1	1	**126**	203	0	1	**204**	**841**
8:45 to 9:45	255	2	2	**259**	181	3	3	**187**	122	1	1	**124**	170	1	1	**172**	**742**
9:00 to 10:00	249	2	3	**254**	181	3	2	**186**	123	3	1	**127**	168	1	1	**170**	**737**
AM Totals	**900**	**7**	**4**	**911**	**517**	**6**	**18**	**541**	**336**	**4**	**6**	**346**	**648**	**2**	**6**	**656**	**2,454**
14:00 to 15:00	194	2	2	**198**	194	1	4	**199**	128	1	2	**131**	155	1	3	**159**	**687**
14:15 to 15:15	204	1	3	**208**	199	0	4	**203**	146	4	2	**152**	162	0	1	**163**	**726**
14:30 to 15:30	217	3	3	**223**	242	1	7	**250**	161	5	2	**168**	149	0	1	**150**	**791**
14:45 to 15:45	216	2	3	**221**	254	1	15	**270**	176	4	2	**182**	131	0	4	**135**	**808**
15:00 to 16:00	219	2	1	**222**	269	1	13	**283**	176	4	1	**181**	128	0	5	**133**	**819**
15:15 to 16:15	205	2	0	**207**	290	1	12	**303**	153	1	2	**156**	116	0	5	**121**	**787**
15:30 to 16:30	186	0	0	**186**	254	0	9	**263**	156	0	3	**159**	114	1	5	**120**	**728**
15:45 to 16:45	169	0	2	**171**	259	0	0	**259**	156	0	3	**159**	105	1	2	**108**	**697**
16:00 to 17:00	168	0	2	**170**	250	0	0	**250**	148	0	3	**151**	101	1	2	**104**	**675**
16:15 to 17:15	150	0	2	**152**	258	0	0	**258**	156	0	3	**159**	99	1	2	**102**	**671**
16:30 to 17:30	126	0	2	**128**	250	0	0	**250**	148	0	2	**150**	86	1	2	**89**	**617**
16:45 to 17:45	124	0	0	**124**	206	0	0	**206**	123	0	2	**125**	91	1	2	**94**	**549**
17:00 to 18:00	111	0	0	**111**	180	0	0	**180**	122	0	2	**124**	86	1	2	**89**	**504**
PM Totals	**692**	**4**	**5**	**701**	**893**	**2**	**17**	**912**	**574**	**5**	**8**	**587**	**470**	**3**	**12**	**485**	**2,685**

Job No. : AUNSW10178
Client : TTW (Taylor Thomson Whitting) (NSW) Pty Ltd
Suburb : Liverpool
Location : 5. Lachlan St / Primary School Access

Day/Date : Thursday, 1 August 2024
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



MATRIX Traffic and Transport Data

	Approach	Primary School Access				Lachlan St					Lachlan St				Grand Total
	Time Period	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total		Lights	Heavies	Buses	Total	
AM	7:15 to 8:15	11	0	0	**11**	178	1	0	**179**		638	2	0	**640**	**830**
PM	15:30 to 16:30	13	0	0	**13**	479	0	0	**479**		143	0	0	**143**	**635**

Approach	Primary School Access				Lachlan St					Lachlan St				Grand Total
Time Period	Lights	Heavies	Buses	Total	Lights	Heavies	Buses	Total		Lights	Heavies	Buses	Total	
7:00 to 8:00	2	1	0	**3**	163	1	0	**164**		612	2	0	**614**	**781**
7:15 to 8:15	11	0	0	**11**	178	1	0	**179**		638	2	0	**640**	**830**
7:30 to 8:30	28	0	0	**28**	187	0	0	**187**		609	2	0	**611**	**826**
7:45 to 8:45	43	0	0	**43**	169	1	0	**170**		539	1	0	**540**	**753**
8:00 to 9:00	44	0	0	**44**	141	2	0	**143**		410	1	0	**411**	**598**
8:15 to 9:15	35	0	0	**35**	135	3	0	**138**		339	3	0	**342**	**515**
8:30 to 9:30	17	0	0	**17**	113	4	0	**117**		301	4	0	**305**	**439**
8:45 to 9:45	3	0	0	**3**	108	4	0	**112**		278	5	0	**283**	**398**
9:00 to 10:00	2	0	0	**2**	122	4	0	**126**		282	5	0	**287**	**415**
AM Totals	**48**	**1**	**0**	49	**426**	**7**	**0**	**433**		**1,304**	**8**	**0**	1,312	1,794
14:00 to 15:00	37	1	0	**38**	262	1	0	**263**		196	2	1	**199**	**500**
14:15 to 15:15	41	1	0	**42**	271	1	0	**272**		181	2	0	**183**	**497**
14:30 to 15:30	41	1	0	**42**	280	1	0	**281**		166	3	0	**169**	**492**
14:45 to 15:45	16	1	0	**17**	321	1	0	**322**		159	3	0	**162**	**501**
15:00 to 16:00	12	1	0	**13**	371	1	0	**372**		155	3	0	**158**	**543**
15:15 to 16:15	13	1	0	**14**	440	0	0	**440**		151	2	0	**153**	**607**
15:30 to 16:30	13	0	0	**13**	479	0	0	**479**		143	0	0	**143**	**635**
15:45 to 16:45	9	0	0	**9**	491	1	0	**492**		127	0	0	**127**	**628**
16:00 to 17:00	8	0	0	**8**	496	1	0	**497**		116	0	0	**116**	**621**
16:15 to 17:15	5	0	0	**5**	491	3	0	**494**		124	1	0	**125**	**624**
16:30 to 17:30	4	0	0	**4**	472	3	0	**475**		114	1	0	**115**	**594**
16:45 to 17:45	4	0	0	**4**	428	2	0	**430**		123	1	0	**124**	**558**
17:00 to 18:00	2	0	0	**2**	384	2	0	**386**		123	1	0	**124**	**512**
PM Totals	**59**	**2**	**0**	61	**1,513**	**5**	**0**	1,518		**590**	**6**	**1**	597	2,176

Appendix B Correspondence Between SINSW & TfNSW

Michael Partadinata

From: John Broady <John.Broady@transport.nsw.gov.au>
Sent: Friday, 20 September 2024 7:01 AM
To: Michael Partadinata
Cc: Maria Mulholland; Mukhwinder Athwal
Subject: RE: Bus services for proposed Liverpool BGHS Redevelopment

Hi Michael

I have prepared a plan for the next round of funding to provide a link from Orange Grove to Liverpool High School.

As I said in the meeting, I am proposing an extension after the trips arrive in the Liverpool Interchange.

John

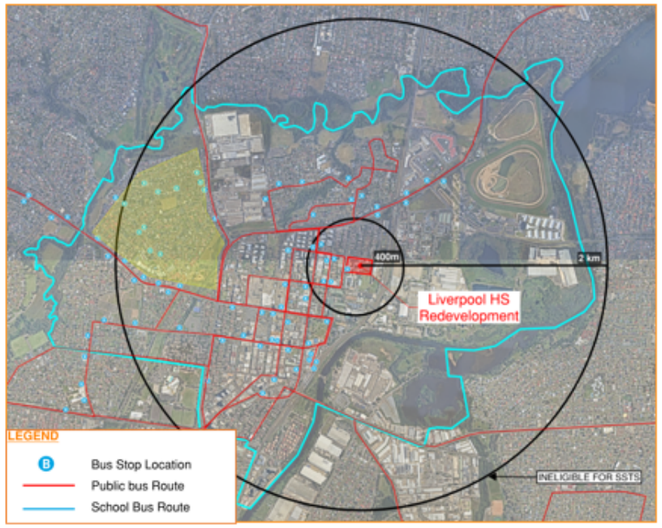
From: Michael Partadinata <michael.partadinata@ttw.com.au>
Sent: Wednesday, September 18, 2024 10:23 AM
To: John Broady <John.Broady@transport.nsw.gov.au>
Cc: Maria Mulholland <maria.mulholland@ttw.com.au>; Mukhwinder Athwal <Mukhwinder.ATHWAL@transport.nsw.gov.au>
Subject: Bus services for proposed Liverpool BGHS Redevelopment

Hi John,

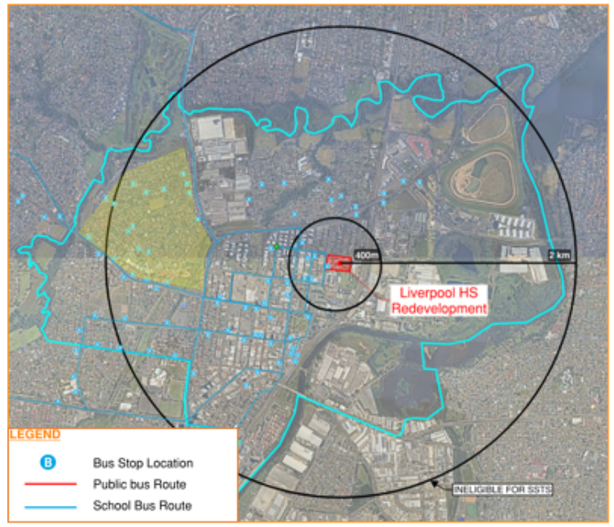
Thank you for your input in the TWG yesterday for the Liverpool BGHS redevelopment project.

As a brief recap, we have identified that in the western part of the catchment (highlighted in yellow), there are no public or school bus services that are available for passengers within 400 meters of the school. Currently, the available service is 819 service, which operates every 30 minutes during peak hours and every hour during off-peak times. The closest bus stop that this bus serves is a 600-metre walk from the school (Liverpool Hospital, Elizabeth St bus stop).
Based on our analysis the 819 service has the ability to accommodate ~200 students and therefore, we are proposing to reroute this service via the school site. Please see below for more information.

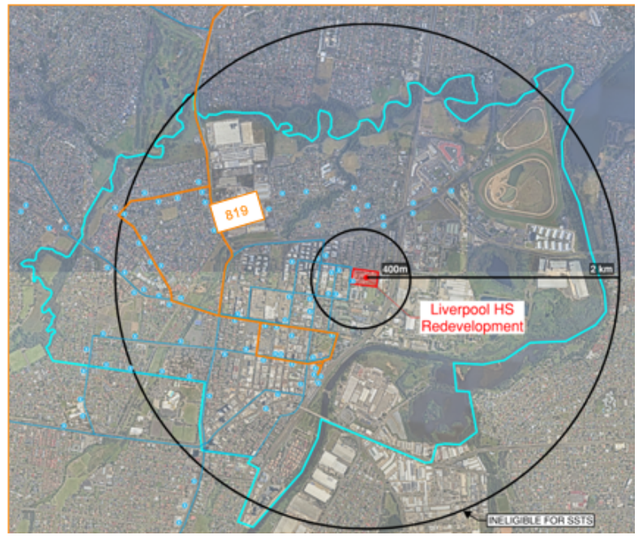
Public Bus Services



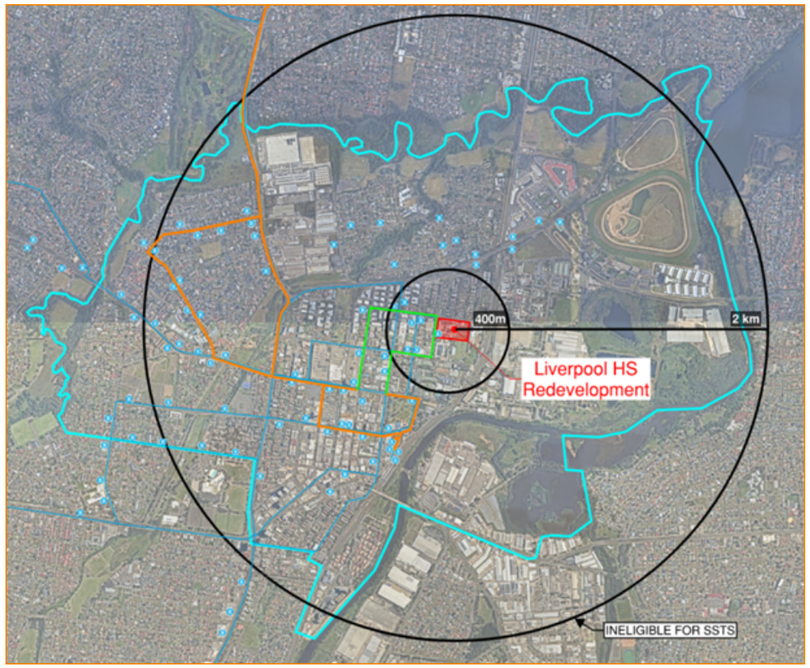
School Bus Services



Existing Bus Service Route



Re-route: We are proposing that bus 819 take a left turn at George Street, right at Lachlan Street, Right at Forbes St, and stop at our school. See below for the proposal.
Bell Times: 8:50am & 3:10pm (TBC with the new school Principal)



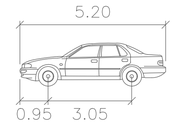
We are aware this analysis will be subject to a detailed review; however, we would appreciate if you could review and provide any other options you may have.
If you need more information, feel free to let me know.

Regards,
Michael

Michael Partadinata | Graduate Traffic Engineer
+61 2 9439 7288 | | michael.partadinata@ttw.com.au
TTW Engineers | Sydney
Read our latest news here

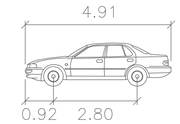
Appendix C Swept Path

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C01



B99

	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.9



B85

	meters
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

THIS DRAWING HAS BEEN PREPARED USING COLOUR

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8m

1:10 A1 1:20 A3

FileName: 241253-TTW-00-DR-TR-00001-[P1]-B99 & B85 Swept Paths.dwg - USER: mpartasindata - Plot File Created: Feb 05, 2025 - 11:56am

Rev	Description	Eng	Draft	Date
1	ISSUE FOR REF SUBMISSION	MP	MP	31/01/2025

ARCHITECT

NBRS

4 Glen St
MILSONS POINT NSW 2061 Australia

Engineer

TTW Structural Civil Traffic Façade

612 9439 7288 | Level 6, 73 Miller Street, North Sydney, NSW 2060

Project

LIVERPOOL BOYS AND GIRLS HIGH SCHOOL UPGRADE PROJECT

Sheet Subject

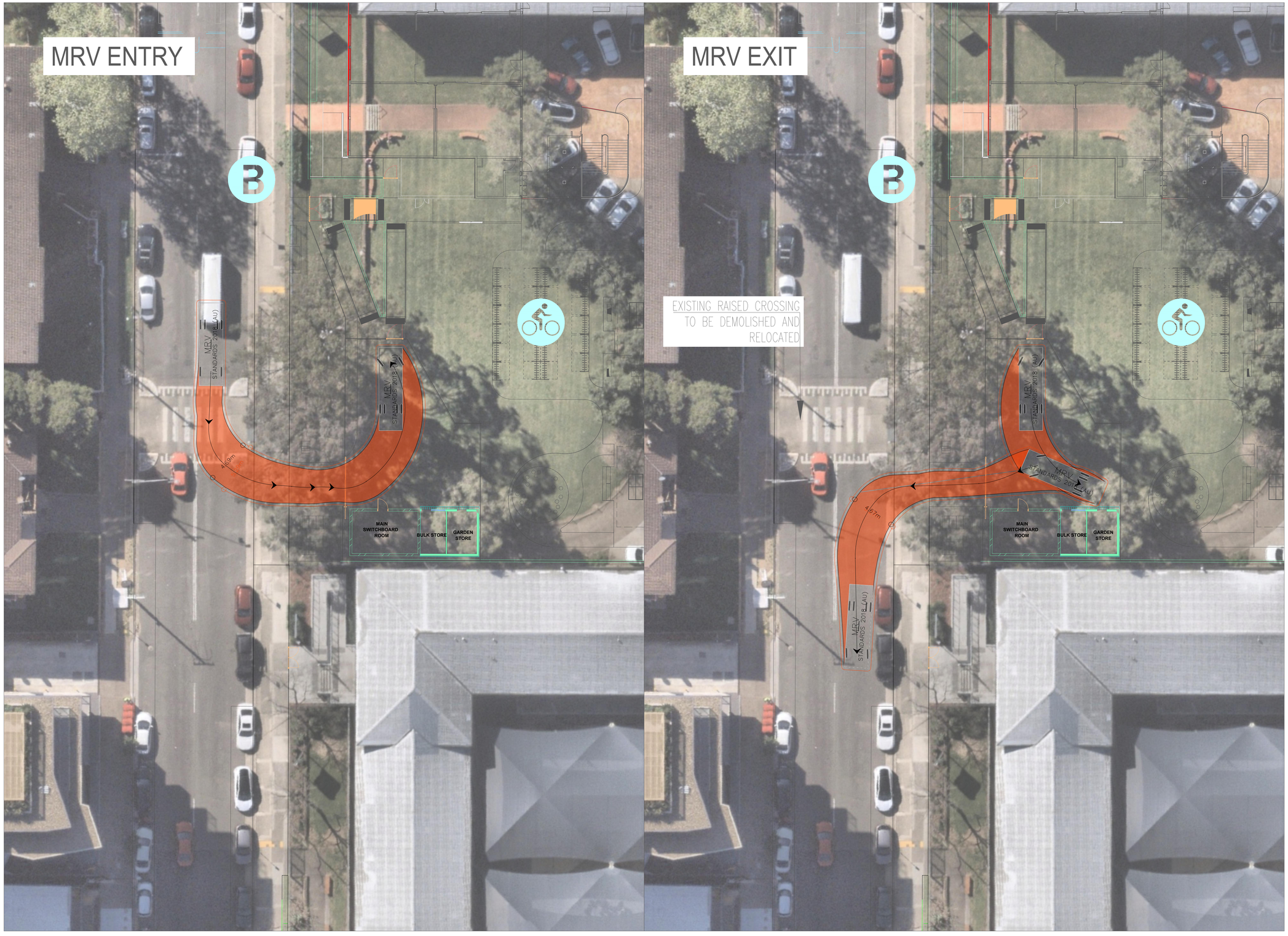
B99 & B85 ENTRY & EXIT SWEPT PATH

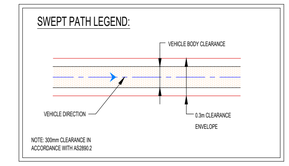
Scale : A1	Drawn	Authorised
1:500	MP	MM

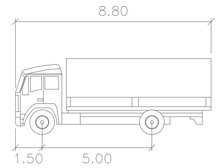
Job No	Drawing No	Revision
241253	TTW-00-DR-TR-00001	1

Plot File Created: Feb 05, 2025 - 11:56am

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C01







MRV

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 34.0

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8m

1:10 A1 1:20 A3

THIS DRAWING HAS BEEN PREPARED USING COLOUR

FileName: 241253-TTW-00-DR-TR-00002-[P1]-MRV Entry & Exit Swept Paths.dwg - USER: mpartadinata - Plot File Created: Jan 31, 2025 - 3:36pm

Rev	Description	Eng	Draft	Date
1	ISSUE FOR REF SUBMISSION	MP	MP	31/01/2025

ARCHITECT

NBRS

4 Glen St
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Engineer

TTW Structural Civil Traffic Façade

612 9439 7288 | Level 6, 73 Miller Street, North Sydney, NSW 2060

Project

LIVERPOOL BOYS AND GIRLS HIGH SCHOOL UPGRADE PROJECT

Sheet Subject

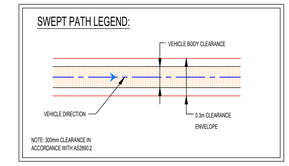
LOADING DOCK
8.8m MRV ENTRY & EXIT
SWEPT PATH

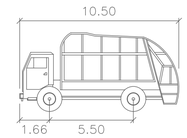
Scale : A1	Drawn	Authorised
1:500	MP	MM

Job No	Drawing No	Revision
241253	TTW-00-DR-TR-00002	1

Plot File Created: Jan 31, 2025 - 3:36pm

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C01





10.5–Metre Waste Truck

	meters
Width	: 2.80
Track	: 2.39
Lock to Lock Time	: 6.0
Steering Angle	: 41.8

THIS DRAWING HAS BEEN PREPARED USING COLOUR

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8m

1:10 A1 1:20 A3

FileName: 241253-TTW-00-DR-TR-00003-[P1]Waste Entry & Exit Swept Paths.dwg - USER: mpartlandnats - Plot File Created: Jan 31, 2025 - 4:35pm

Rev	Description	Eng	Draft	Date
1	ISSUE FOR REF SUBMISSION	MP	MP	31/01/2025

ARCHITECT

NBRS

4 Glen St
MILSONS POINT NSW 2061 Australia

Engineer

TTW Structural Civil Traffic Façade

612 9439 7288 | Level 6, 73 Miller Street, North Sydney, NSW 2060

Project

LIVERPOOL BOYS AND GIRLS HIGH SCHOOL UPGRADE PROJECT

Sheet Subject

10.5m WASTE TRUCK ENTRY & EXIT SWEPT PATH

Scale : A1	Drawn	Authorised
1:500	MP	MM

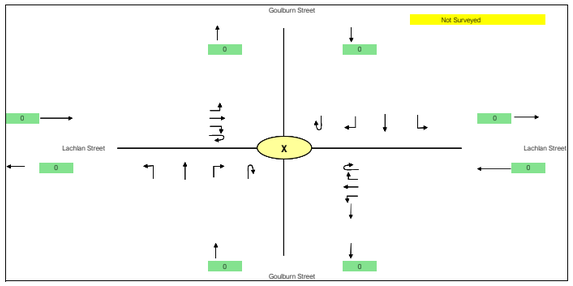
Job No	Drawing No	Revision
241253	TTW-00-DR-TR-00003	1

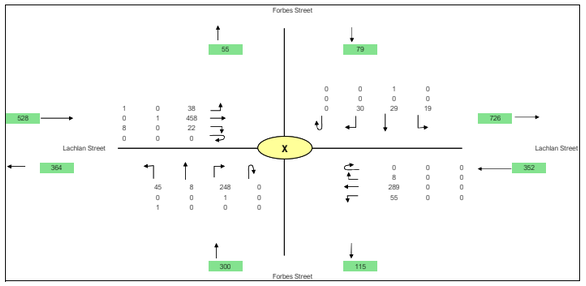
Plot File Created: Jan 31, 2025 - 4:35pm

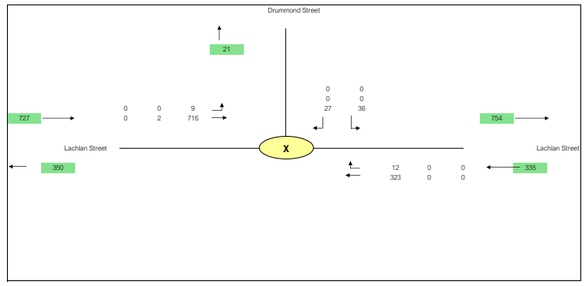
Appendix D Traffic Distribution

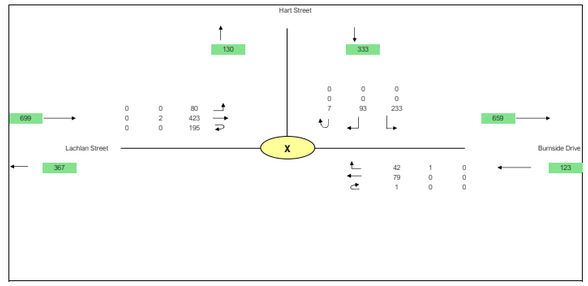
Scenario 2

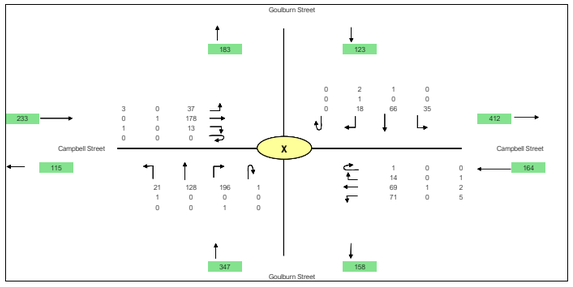
- AM Traffic
- Existing traffic + GPS Stage 1 Full Capacity

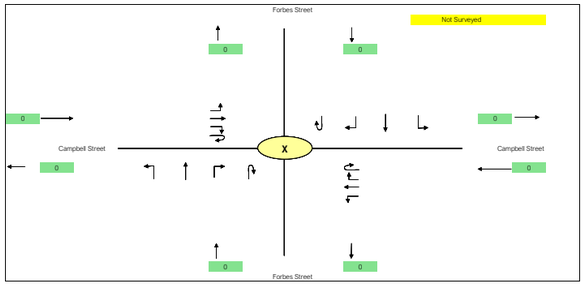


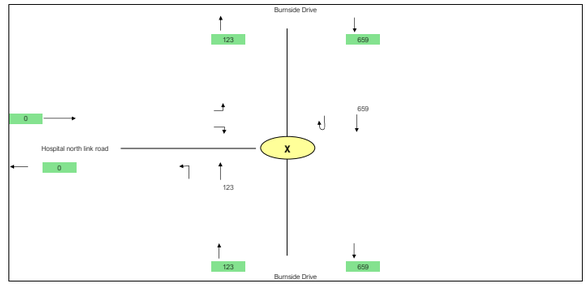






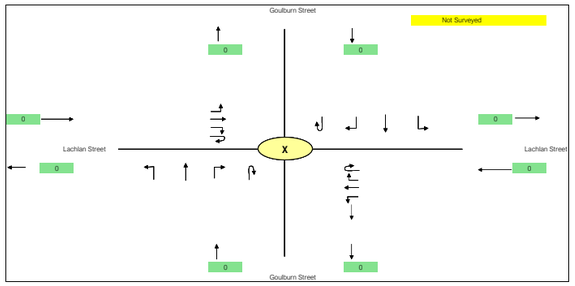


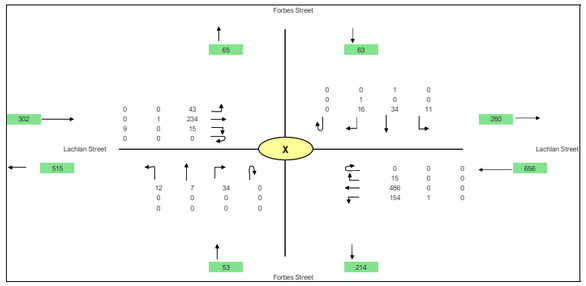


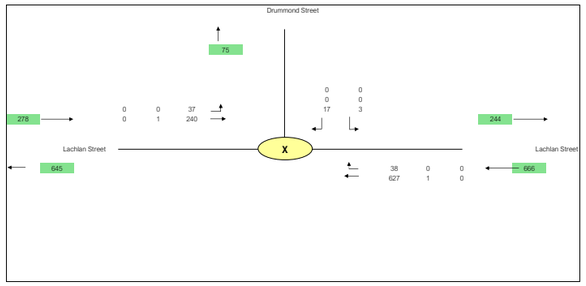


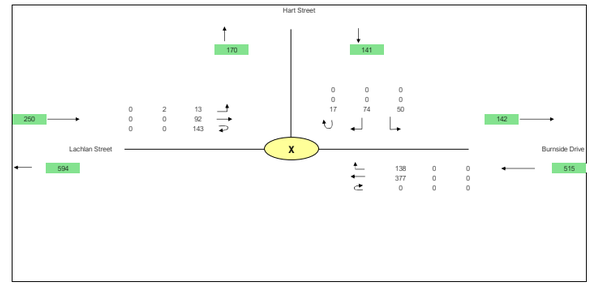
Scenario 2

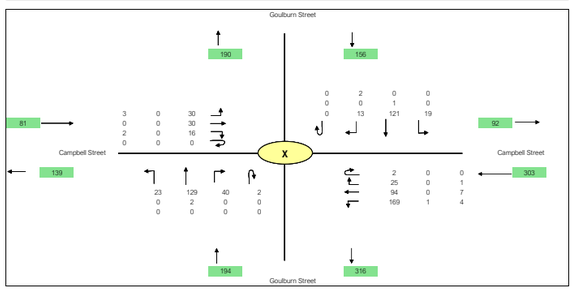
- PM Traffic
- Existing traffic + GPS Stage 1 Full Capacity

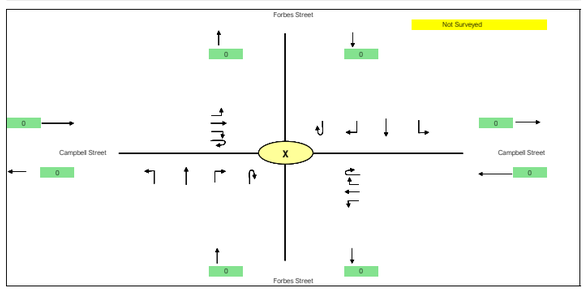


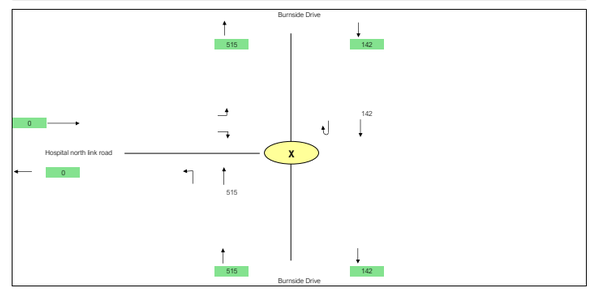






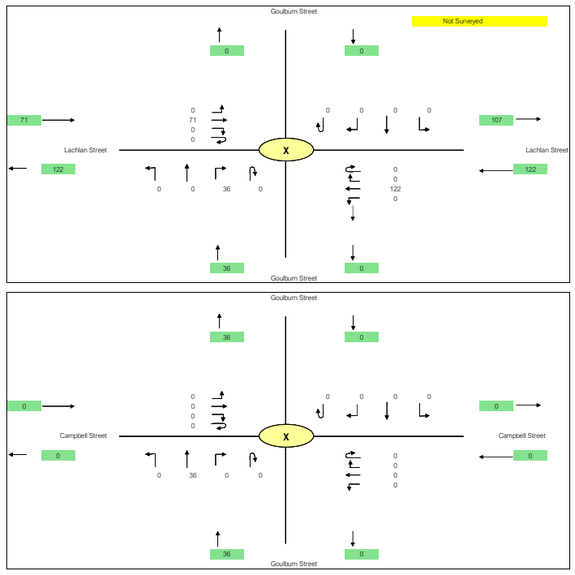


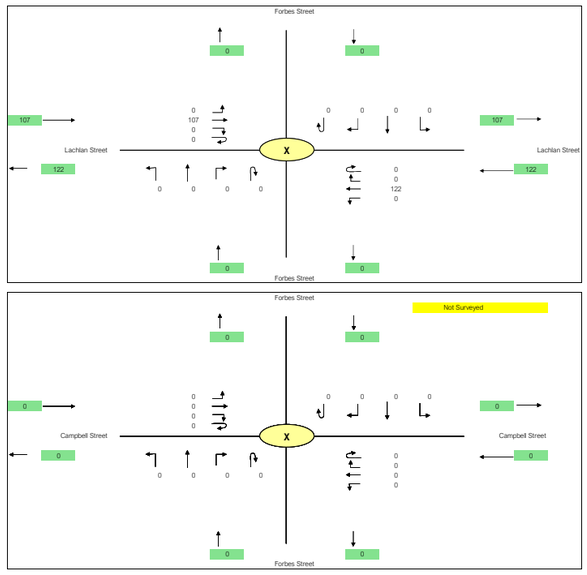


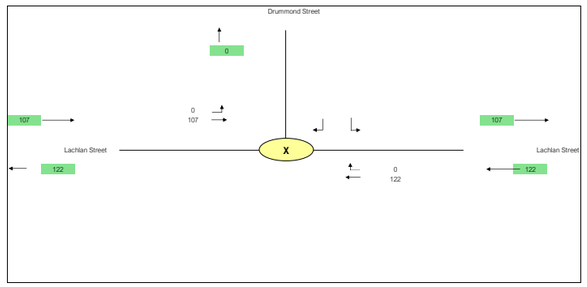


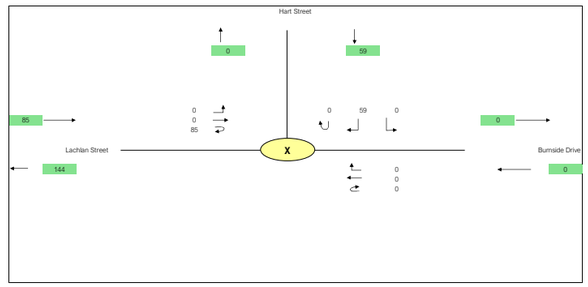
LBGHS Full Development Traffic

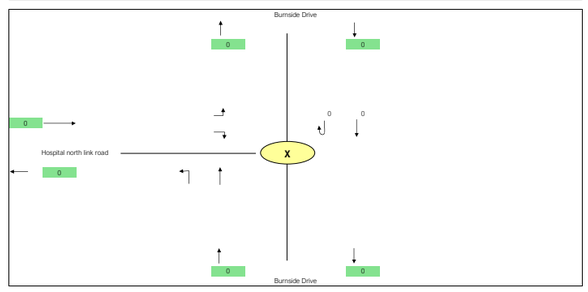
- AM Traffic





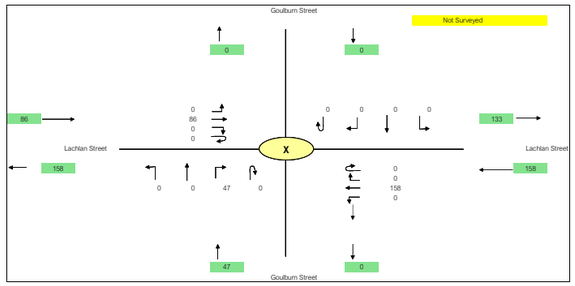


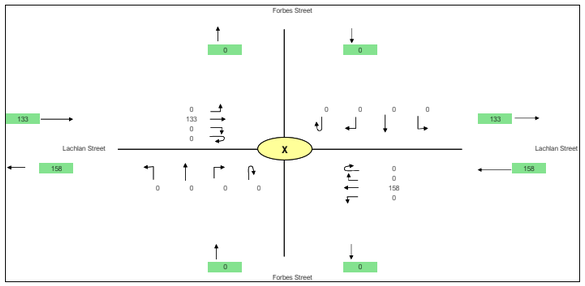


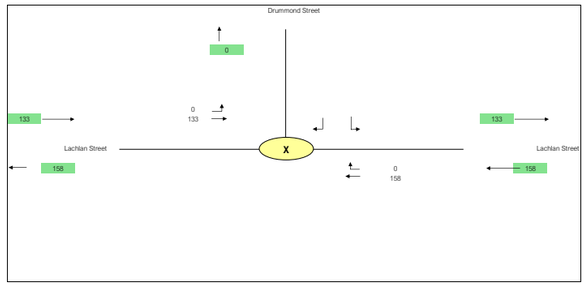


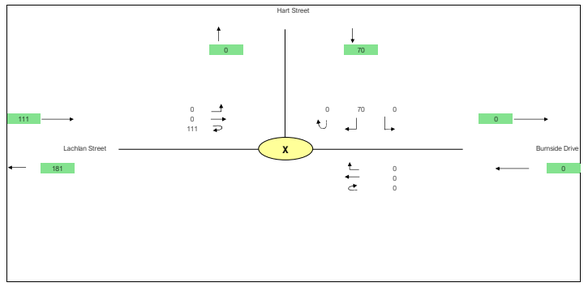
LBGHS Full Development Traffic

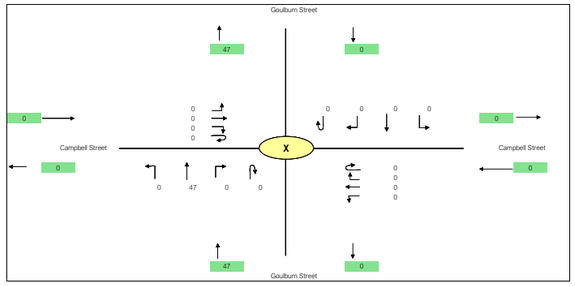
- PM Traffic

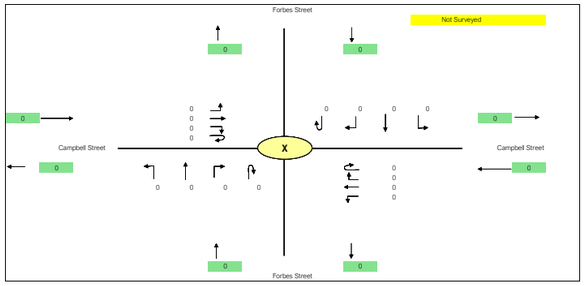


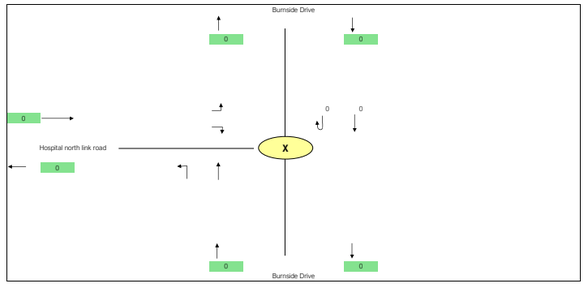






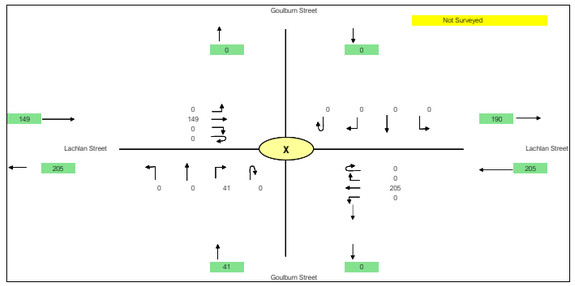


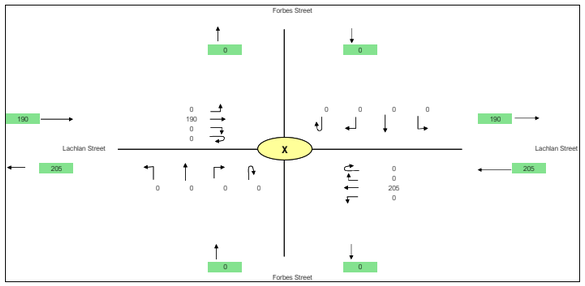


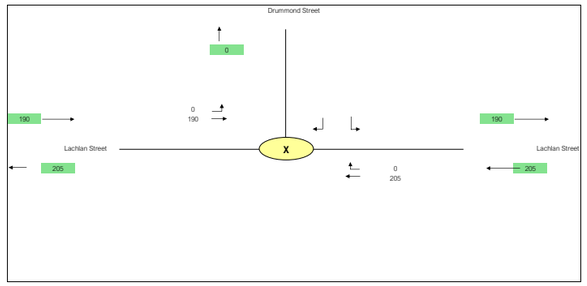


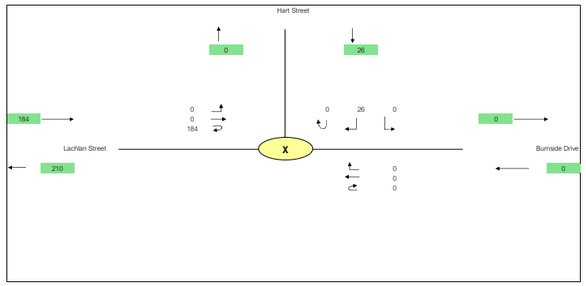
GPS Stage 2 Full Development Traffic

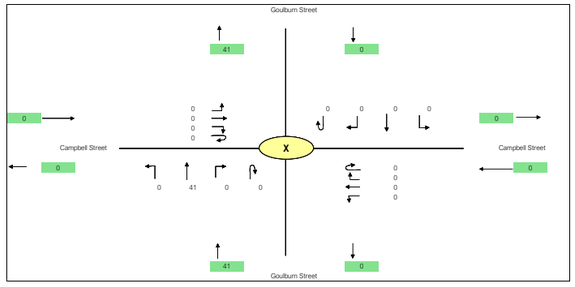
- AM Traffic

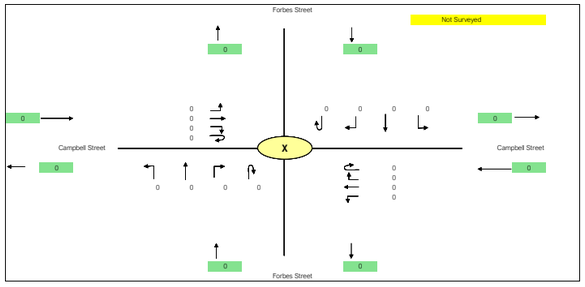


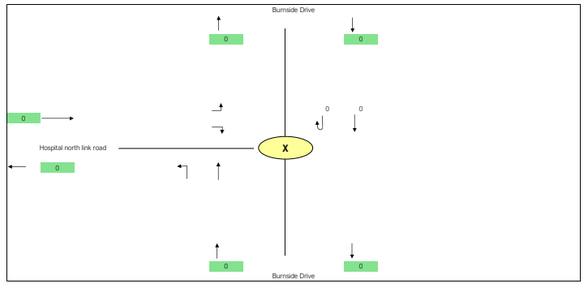






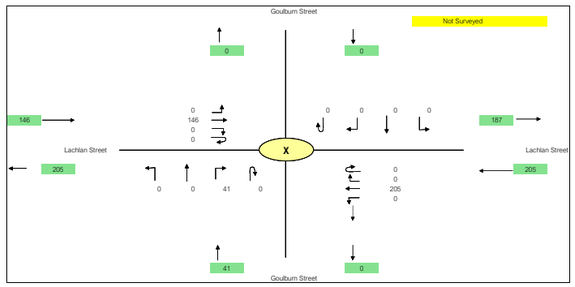


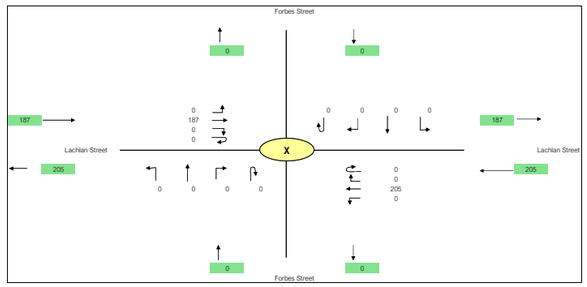


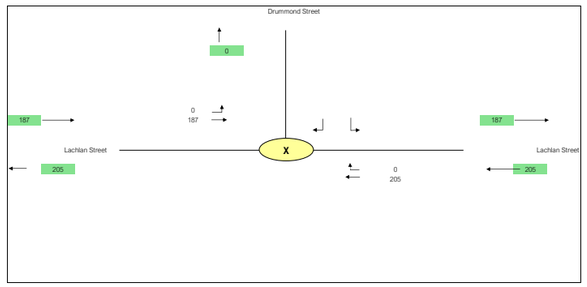


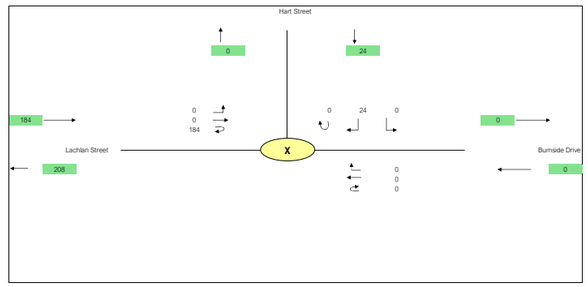
GPS Stage 2 Full Development Traffic

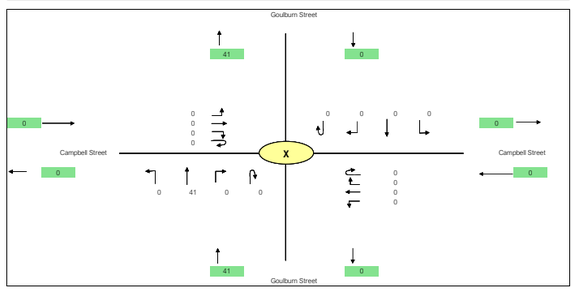
- PM Traffic

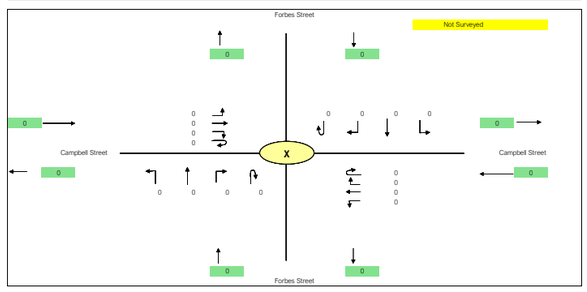


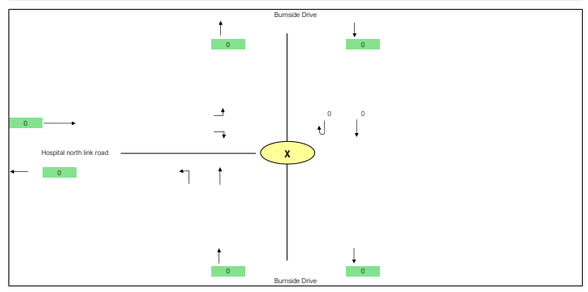








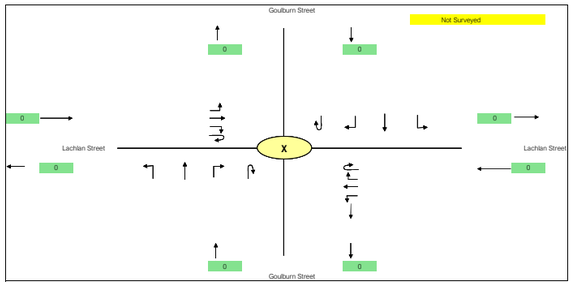


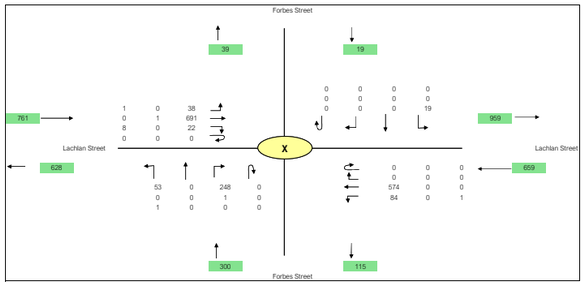


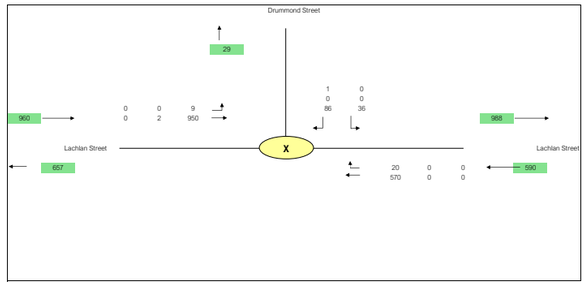
Scenario 3

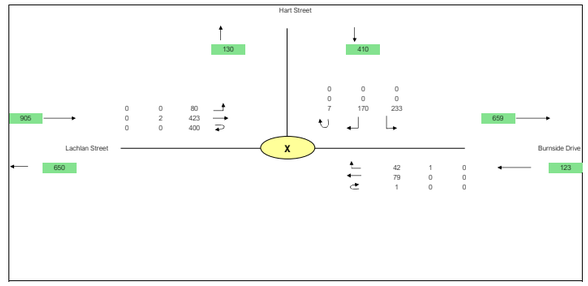
-AM Traffic

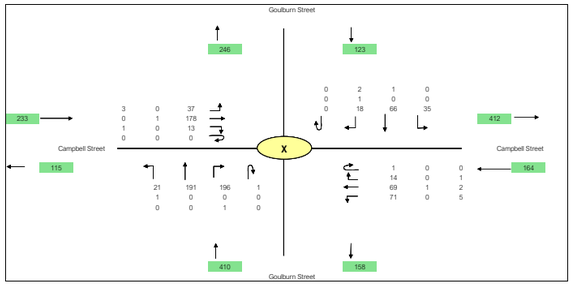
-Existing traffic + LBGHS Full Capacity + Traffic GPS Stage 2 Full Capacity

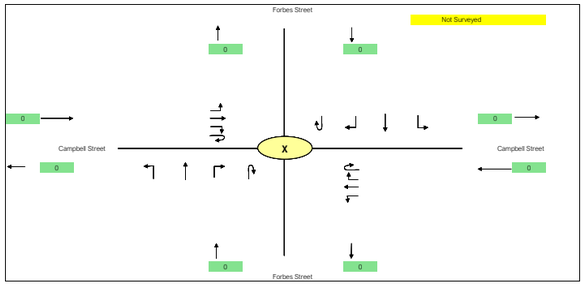


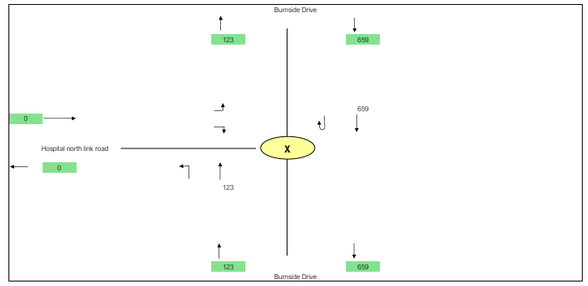








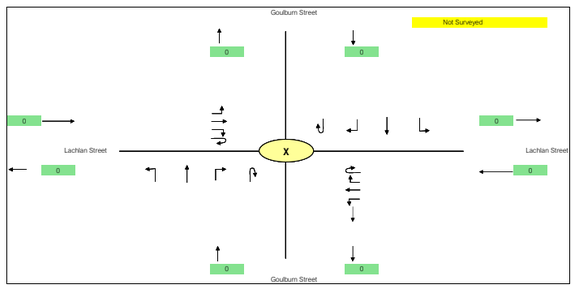


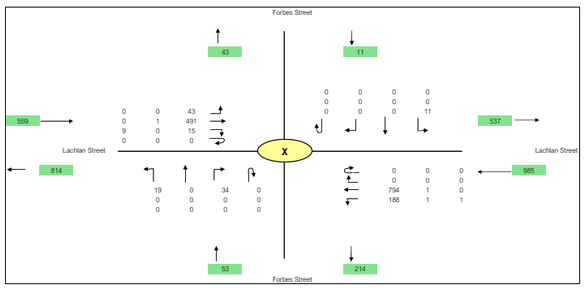


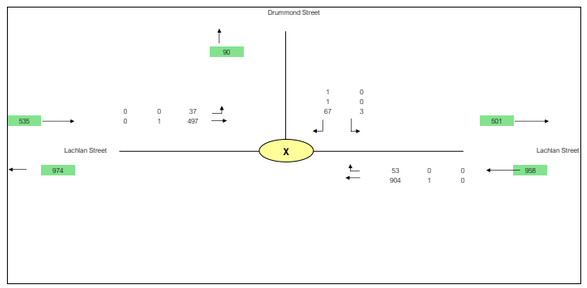
Scenario 3

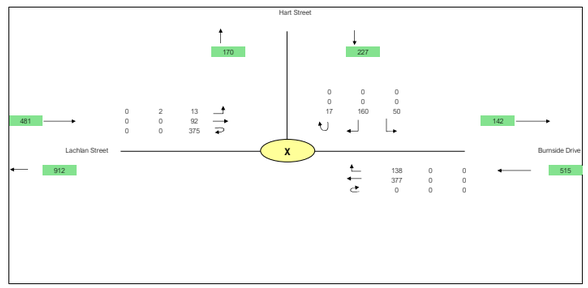
- AM Traffic

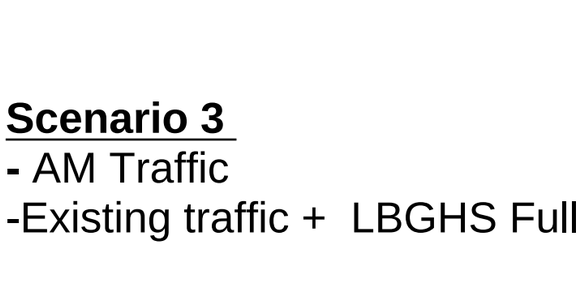
-Existing traffic + LBGHS Full Capacity + Traffic GPS Stage 2 Full Capacity

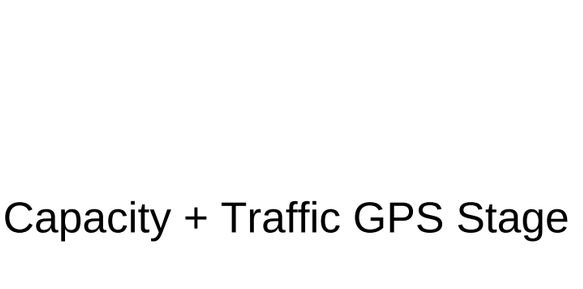






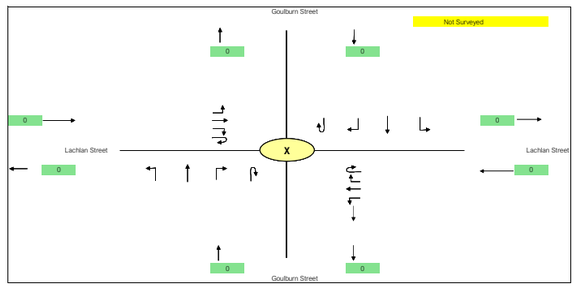


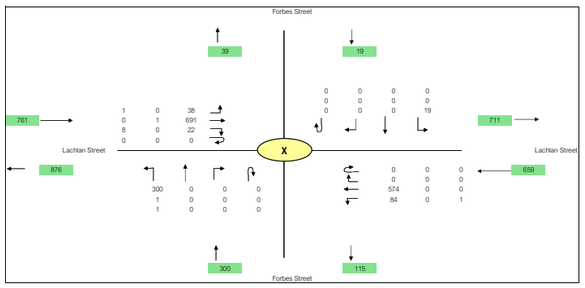


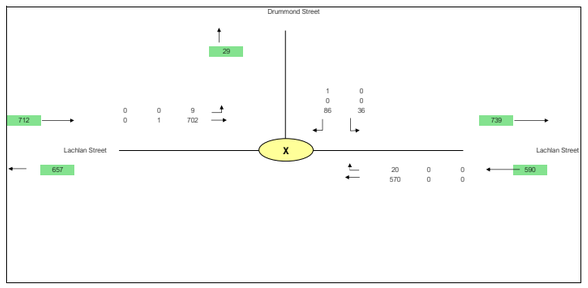


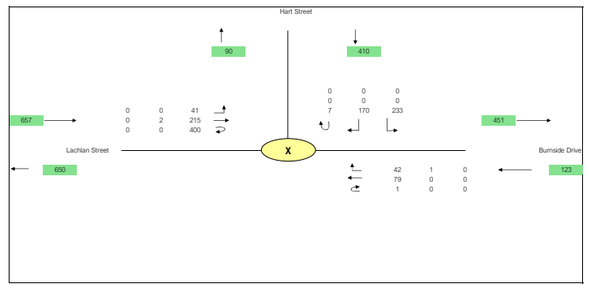
Scenario 3a

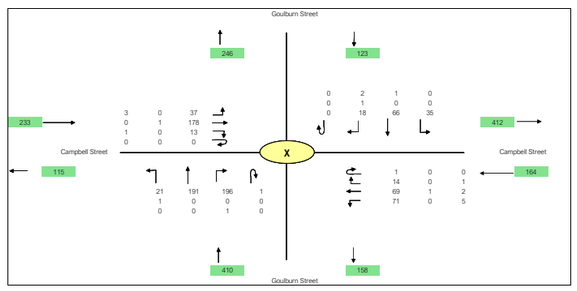
- AM Traffic
- Existing traffic + LBGHS Full Capacity + GPS Stage 2 Full Capacity
- Mitigation measure (right turn ban)

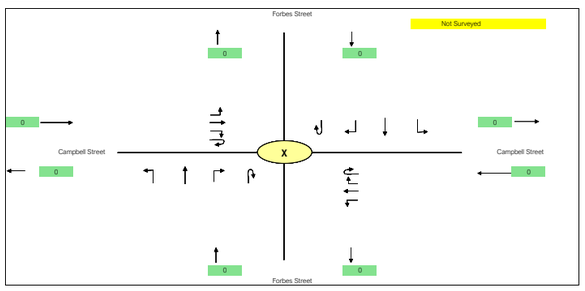


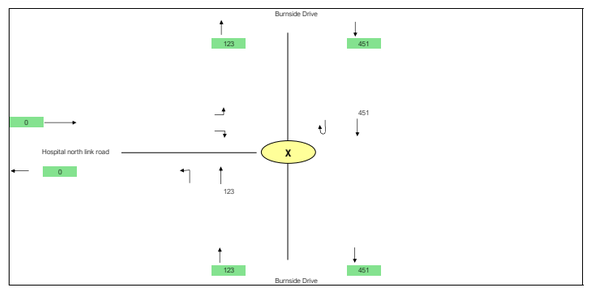






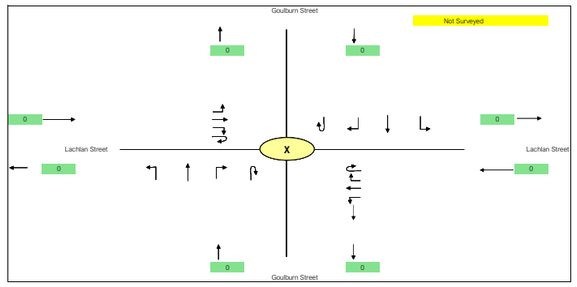


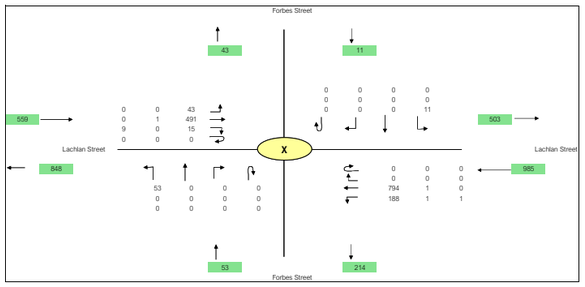


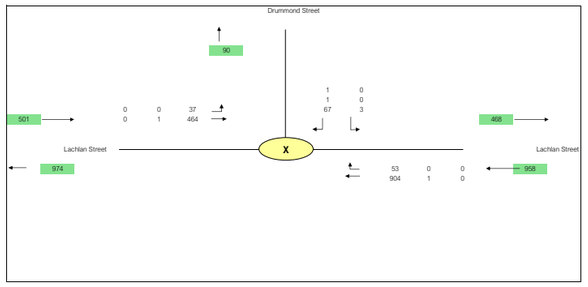


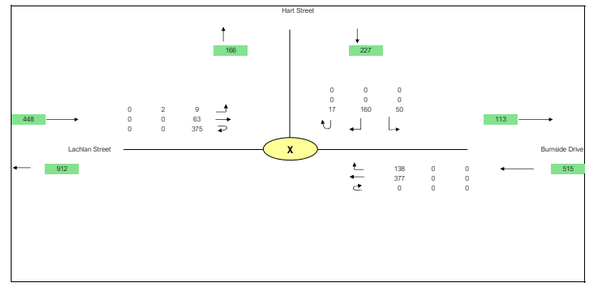
Scenario 3a

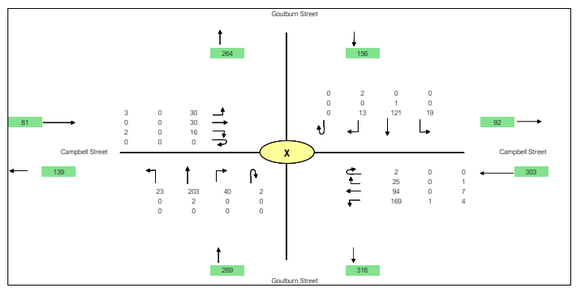
- PM Traffic
- Existing traffic + LBGHS Full Capacity + GPS Stage 2 Full Capacity
- Mitigation measure (right turn ban)

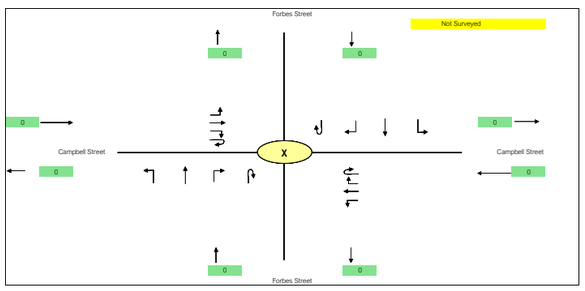


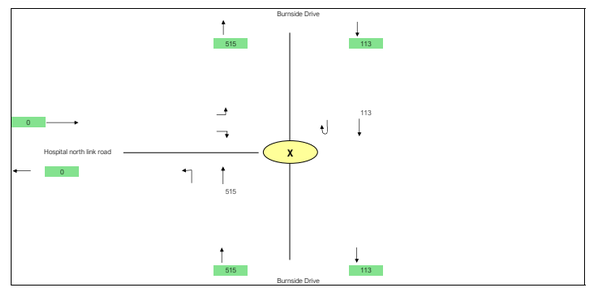






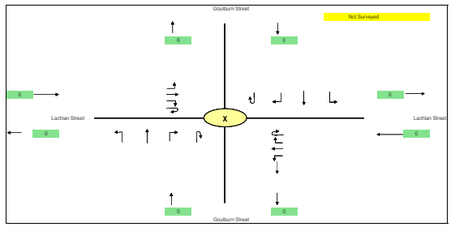


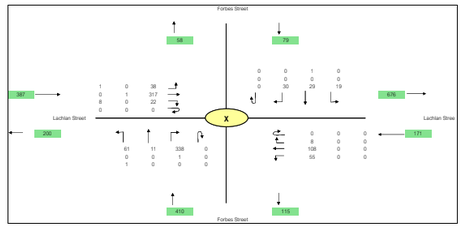


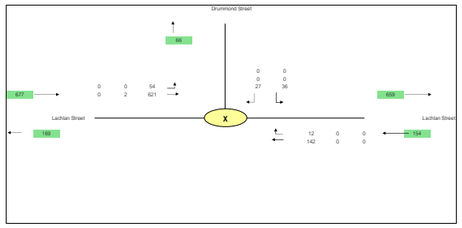


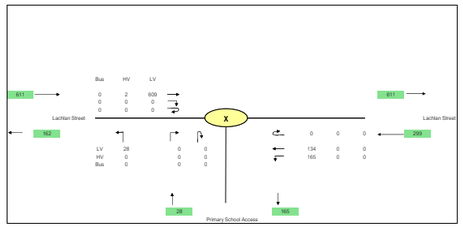
Scenario 4

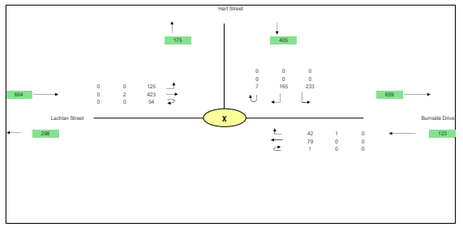
- AM Traffic
- Existing traffic + traffic generated by 112 car parking spaces to GPS access

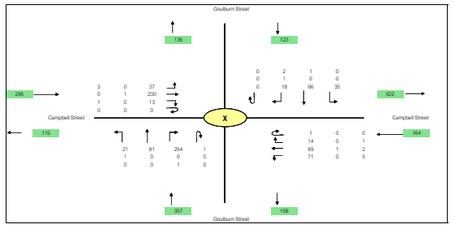


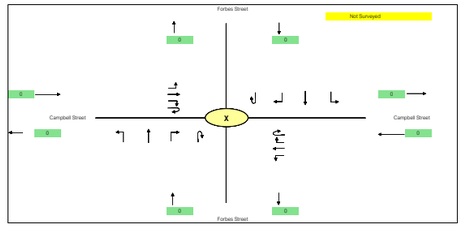


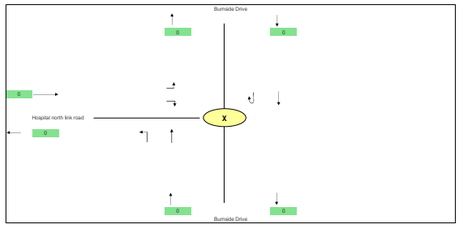






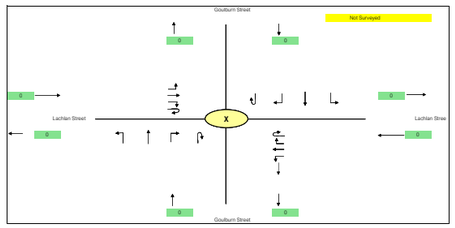


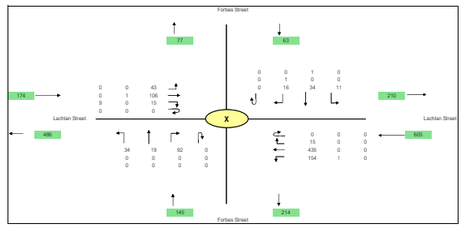


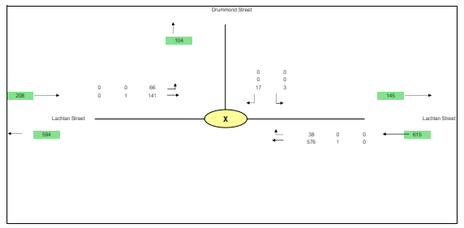


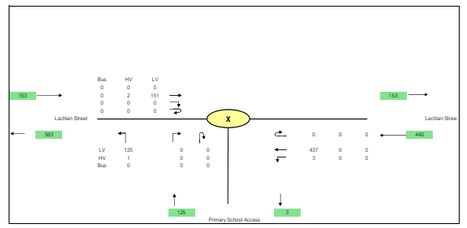
Scenario 4

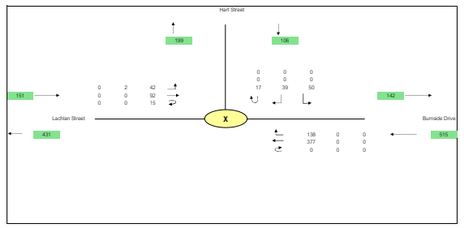
- PM Traffic
- Existing traffic + traffic generated by 112 car parking spaces to GPS access

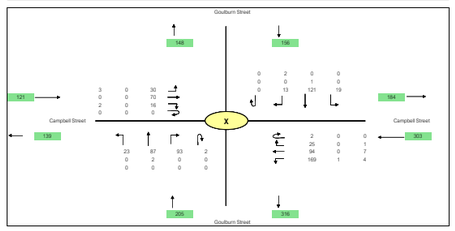


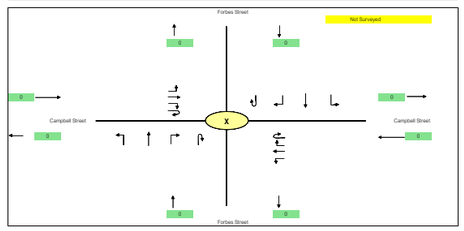


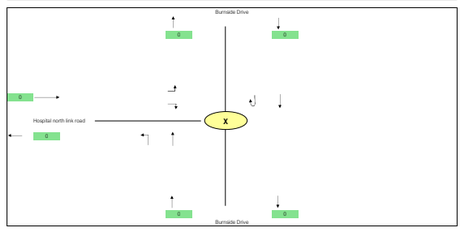












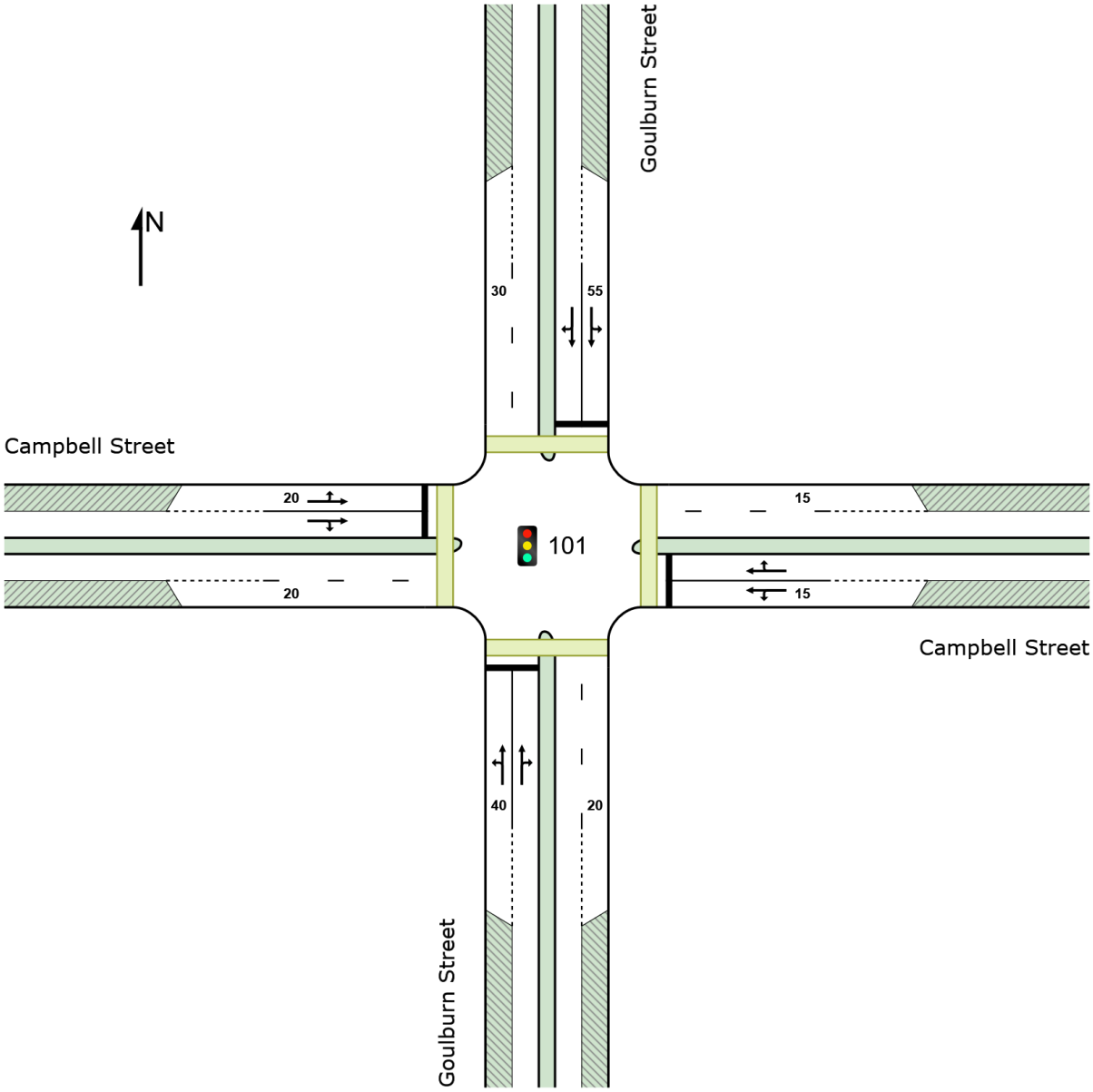
Appendix E SIDRA Modelling Results

SITE LAYOUT

Site: 101 [Campbell Street/ Goulburn Street (Site Folder: Existing 2024 AM)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.

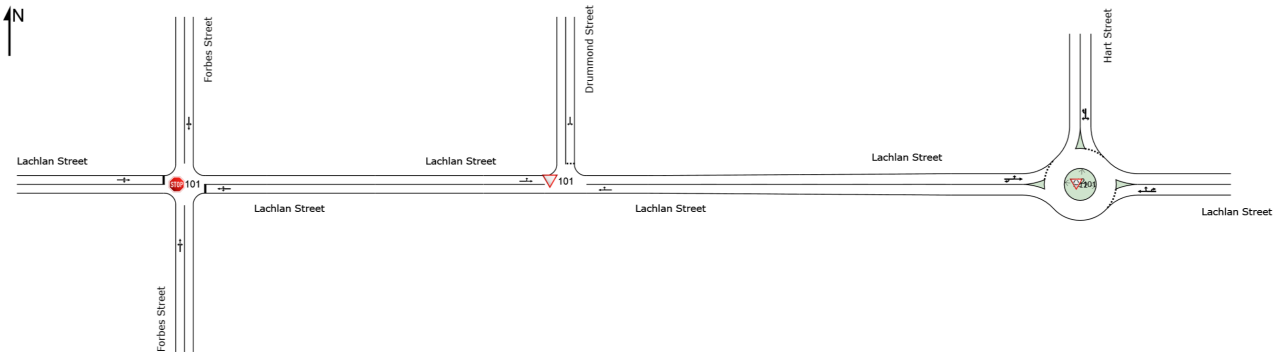


NETWORK LAYOUT

Network: N101 [Existing AM (Network Folder: General)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
101	NA	Hart Street/Lachlan Street
101	NA	Lachlan Street/Drummond Street
101	NA	Lachlan Street/ Forbes Street

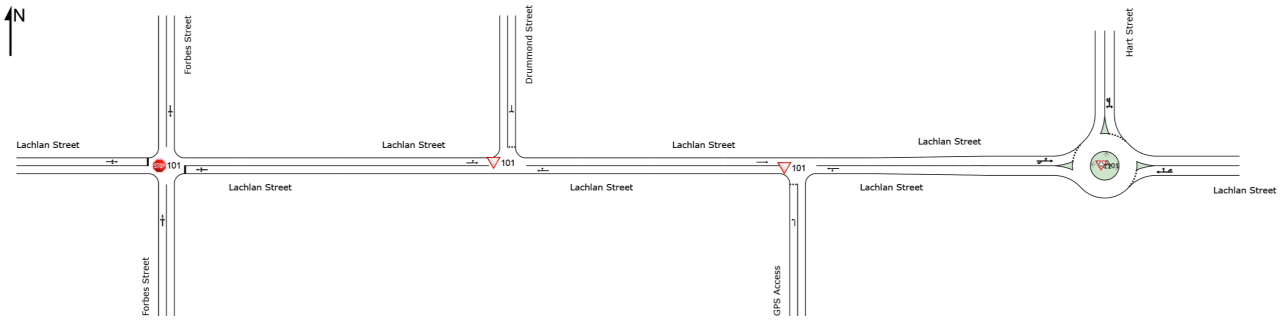
Organisation: TAYLOR THOMSON WHITTING | Licence: NETWORK / 1PC | Created: Wednesday, 5 February 2025 3:23:54 PM
Project: P:\2024\2412\241253\Reports\TTW\LBGH School\7. Traffic Surveys & Modelling\SIDRA Modelling\Liverpool BGHS SIDRA v02.sip9

NETWORK LAYOUT

Network: N101 [Existing w HS car park AM (Network Folder: General)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
101	NA	Hart Street/Lachlan Street
101	NA	Lachlan Street/Drummond Street
101	NA	Lachlan Street/ Forbes Street
101	NA	Lachlan Street/ Primary School Access

MOVEMENT SUMMARY

Site: 101 [Hart Street/Lachlan Street (Site Folder: Existing 2024 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing AM (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	1	0.0	1	0.0	0.111	2.7	LOS A	0.6	4.2	0.30	0.56	0.30	34.9
6	R2	All MCs	83	0.0	83	0.0	0.111	6.1	LOS A	0.6	4.2	0.30	0.56	0.30	36.7
6u	U	All MCs	45	2.3	45	2.3	0.111	7.5	LOS A	0.6	4.2	0.30	0.56	0.30	36.7
Approach			129	0.8	129	0.8	0.111	6.6	LOS A	0.6	4.2	0.30	0.56	0.30	36.7
North: Hart Street															
7	L2	All MCs	245	0.0	245	0.0	0.380	6.2	LOS A	2.5	17.6	0.74	0.67	0.74	36.9
9	R2	All MCs	56	0.0	56	0.0	0.380	9.4	LOS A	2.5	17.6	0.74	0.67	0.74	34.8
9u	U	All MCs	7	0.0	7	0.0	0.380	10.8	LOS A	2.5	17.6	0.74	0.67	0.74	36.8
Approach			308	0.0	308	0.0	0.380	6.9	LOS A	2.5	17.6	0.74	0.67	0.74	36.7
West: Lachlan Street															
10	L2	All MCs	132	0.0	132	0.0	0.503	3.3	LOS A	4.0	28.1	0.46	0.42	0.46	36.5
11	T1	All MCs	447	0.5	447	0.5	0.503	3.1	LOS A	4.0	28.1	0.46	0.42	0.46	36.7
12u	U	All MCs	57	0.0	57	0.0	0.503	7.9	LOS A	4.0	28.1	0.46	0.42	0.46	28.2
Approach			636	0.3	636	0.3	0.503	3.6	LOS A	4.0	28.1	0.46	0.42	0.46	36.4
All Vehicles			1074	0.3	1074	0.3	0.503	4.9	LOS A	4.0	28.1	0.52	0.51	0.52	36.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/Drummond Street (Site Folder: Existing 2024 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing AM (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	149	0.0	149	0.0	0.093	0.6	LOS A	0.2	1.2	0.14	0.16	0.14	36.1
6	R2	All MCs	13	0.0	13	0.0	0.093	7.1	LOS A	0.2	1.2	0.14	0.16	0.14	38.3
Approach			162	0.0	162	0.0	0.093	1.1	NA	0.2	1.2	0.14	0.16	0.14	36.7
North: Drummond Street															
7	L2	All MCs	38	0.0	38	0.0	0.103	6.5	LOS A	0.3	2.4	0.58	0.78	0.58	34.4
9	R2	All MCs	28	0.0	28	0.0	0.103	8.9	LOS A	0.3	2.4	0.58	0.78	0.58	34.4
Approach			66	0.0	66	0.0	0.103	7.5	LOS A	0.3	2.4	0.58	0.78	0.58	34.4
West: Lachlan Street															
10	L2	All MCs	57	0.0	57	0.0	0.368	3.4	LOS A	0.0	0.0	0.00	0.04	0.00	38.9
11	T1	All MCs	656	0.3	656	0.3	0.368	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	38.9
Approach			713	0.3	713	0.3	0.368	0.3	NA	0.0	0.0	0.00	0.04	0.00	38.9
All Vehicles			941	0.2	941	0.2	0.368	0.9	NA	0.3	2.4	0.06	0.11	0.06	37.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/ Forbes Street (Site Folder: Existing 2024 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing AM (Network Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forbes Street															
1	L2	All MCs	65	1.6	65	1.6	0.249	3.6	LOS A	1.4	9.8	0.17	0.45	0.17	37.9
2	T1	All MCs	12	0.0	12	0.0	0.249	0.2	LOS A	1.4	9.8	0.17	0.45	0.17	38.3
3	R2	All MCs	357	0.3	357	0.3	0.249	3.7	LOS A	1.4	9.8	0.17	0.45	0.17	36.8
Approach			434	0.5	434	0.5	0.249	3.6	NA	1.4	9.8	0.17	0.45	0.17	37.1
East: Lachlan Street															
4	L2	All MCs	58	0.0	58	0.0	0.237	6.8	LOS A	1.0	7.0	0.32	0.88	0.32	33.9
5	T1	All MCs	114	0.0	114	0.0	0.237	10.6	LOS A	1.0	7.0	0.32	0.88	0.32	33.9
6	R2	All MCs	8	0.0	8	0.0	0.237	16.4	LOS B	1.0	7.0	0.32	0.88	0.32	33.7
Approach			180	0.0	180	0.0	0.237	9.7	LOS A	1.0	7.0	0.32	0.88	0.32	33.9
North: Forbes Street															
7	L2	All MCs	20	0.0	20	0.0	0.046	3.6	LOS A	0.2	1.3	0.15	0.31	0.15	37.8
8	T1	All MCs	32	3.3	32	3.3	0.046	0.1	LOS A	0.2	1.3	0.15	0.31	0.15	38.8
9	R2	All MCs	32	0.0	32	0.0	0.046	3.8	LOS A	0.2	1.3	0.15	0.31	0.15	38.3
Approach			83	1.3	83	1.3	0.046	2.3	NA	0.2	1.3	0.15	0.31	0.15	38.4
West: Lachlan Street															
10	L2	All MCs	40	0.0	40	0.0	0.612	11.0	LOS A	9.5	68.1	0.57	0.91	0.87	33.6
11	T1	All MCs	335	0.3	335	0.3	0.612	17.4	LOS B	9.5	68.1	0.57	0.91	0.87	29.5
12	R2	All MCs	32	26.7	32	26.7	0.612	28.8	LOS C	9.5	68.1	0.57	0.91	0.87	33.4
Approach			406	2.3	406	2.3	0.612	17.7	LOS B	9.5	68.1	0.57	0.91	0.87	30.6
All Vehicles			1103	1.1	1103	1.1	0.612	9.7	NA	9.5	68.1	0.34	0.68	0.45	34.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Campbell Street/ Goulburn Street (Site Folder: Existing 2024 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Goulburn Street															
1	L2	All MCs	23	4.5	23	4.5	0.156	20.5	LOS B	2.0	13.9	0.77	0.63	0.77	33.2
2	T1	All MCs	85	0.0	85	0.0	0.611	19.5	LOS B	7.5	52.9	0.80	0.67	0.80	33.1
3	R2	All MCs	268	0.4	268	0.4	* 0.611	23.0	LOS B	7.5	52.9	0.91	0.81	0.92	31.6
Approach			377	0.6	377	0.6	0.611	22.0	LOS B	7.5	52.9	0.88	0.77	0.88	32.0
East: Campbell Street															
4	L2	All MCs	80	6.6	80	6.6	0.193	24.1	LOS B	1.9	14.4	0.84	0.72	0.84	31.4
5	T1	All MCs	76	4.2	76	4.2	0.221	21.0	LOS B	2.2	16.3	0.85	0.67	0.85	32.5
6	R2	All MCs	16	6.7	16	6.7	0.221	22.6	LOS B	2.2	16.3	0.85	0.67	0.85	32.2
Approach			172	5.5	172	5.5	0.221	22.6	LOS B	2.2	16.3	0.84	0.70	0.84	31.9
North: Goulburn Street															
7	L2	All MCs	37	0.0	37	0.0	0.066	20.7	LOS B	0.8	5.5	0.74	0.67	0.74	32.6
8	T1	All MCs	71	1.5	71	1.5	0.176	18.2	LOS B	2.0	14.9	0.77	0.63	0.77	33.5
9	R2	All MCs	22	14.3	22	14.3	0.176	16.8	LOS B	2.0	14.9	0.77	0.63	0.77	33.2
Approach			129	3.3	129	3.3	0.176	18.7	LOS B	2.0	14.9	0.77	0.64	0.77	33.2
West: Campbell Street															
10	L2	All MCs	42	7.5	42	7.5	0.122	28.2	LOS B	1.2	9.0	0.82	0.69	0.82	31.7
11	T1	All MCs	243	0.4	243	0.4	0.590	27.8	LOS B	6.7	47.5	0.94	0.78	0.94	32.0
12	R2	All MCs	15	7.1	15	7.1	* 0.590	25.5	LOS B	6.7	47.5	0.94	0.78	0.94	31.7
Approach			300	1.8	300	1.8	0.590	27.7	LOS B	6.7	47.5	0.92	0.76	0.92	30.7
All Vehicles			978	2.2	978	2.2	0.611	23.4	LOS B	7.5	52.9	0.87	0.74	0.87	31.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Goulburn Street												
P1	Full	116	122	24.4	LOS C	0.2	0.2	0.90	0.90	178.3	200.0	1.12
East: Campbell Street												

P2	Full	43	45	24.3	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
North: Goulburn Street												
P3	Full	78	82	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
West: Campbell Street												
P4	Full	41	43	24.3	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		278	293	24.4	LOS C	0.2	0.2	0.90	0.90	178.2	200.0	1.12

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Hart Street/Lachlan Street (Site Folder: Existing 2024 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing PM (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	397	0.0	397	0.0	0.394	2.5	LOS A	2.8	19.3	0.29	0.39	0.29	36.7
6	R2	All MCs	145	0.0	145	0.0	0.394	5.9	LOS A	2.8	19.3	0.29	0.39	0.29	37.8
6u	U	All MCs	1	0.0	1	0.0	0.394	7.3	LOS A	2.8	19.3	0.29	0.39	0.29	37.8
Approach			543	0.0	543	0.0	0.394	3.4	LOS A	2.8	19.3	0.29	0.39	0.29	37.1
North: Hart Street															
7	L2	All MCs	53	0.0	53	0.0	0.094	2.9	LOS A	0.5	3.4	0.29	0.50	0.29	37.6
9	R2	All MCs	41	0.0	41	0.0	0.094	6.1	LOS A	0.5	3.4	0.29	0.50	0.29	36.0
9u	U	All MCs	18	0.0	18	0.0	0.094	7.4	LOS A	0.5	3.4	0.29	0.50	0.29	37.4
Approach			112	0.0	112	0.0	0.094	4.8	LOS A	0.5	3.4	0.29	0.50	0.29	37.2
West: Lachlan Street															
10	L2	All MCs	46	4.5	46	4.5	0.144	3.3	LOS A	0.8	5.4	0.35	0.42	0.35	36.7
11	T1	All MCs	99	2.1	99	2.1	0.144	3.0	LOS A	0.8	5.4	0.35	0.42	0.35	37.0
12u	U	All MCs	16	0.0	16	0.0	0.144	7.7	LOS A	0.8	5.4	0.35	0.42	0.35	28.9
Approach			161	2.6	161	2.6	0.144	3.5	LOS A	0.8	5.4	0.35	0.42	0.35	36.7
All Vehicles			816	0.5	816	0.5	0.394	3.6	LOS A	2.8	19.3	0.30	0.41	0.30	37.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/Drummond Street (Site Folder: Existing 2024 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing PM (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	489	0.2	489	0.2	0.279	0.1	LOS A	0.3	2.4	0.07	0.08	0.07	37.9
6	R2	All MCs	40	0.0	40	0.0	0.279	4.4	LOS A	0.3	2.4	0.07	0.08	0.07	38.6
Approach			529	0.2	529	0.2	0.279	0.4	NA	0.3	2.4	0.07	0.08	0.07	38.2
North: Drummond Street															
7	L2	All MCs	3	0.0	3	0.0	0.031	3.8	LOS A	0.1	0.7	0.48	0.61	0.48	34.9
9	R2	All MCs	18	0.0	18	0.0	0.031	7.2	LOS A	0.1	0.7	0.48	0.61	0.48	34.9
Approach			21	0.0	21	0.0	0.031	6.7	LOS A	0.1	0.7	0.48	0.61	0.48	34.9
West: Lachlan Street															
10	L2	All MCs	69	0.0	69	0.0	0.114	3.4	LOS A	0.0	0.0	0.00	0.15	0.00	38.5
11	T1	All MCs	149	0.7	149	0.7	0.114	0.0	LOS A	0.0	0.0	0.00	0.15	0.00	36.2
Approach			219	0.5	219	0.5	0.114	1.1	NA	0.0	0.0	0.00	0.15	0.00	37.8
All Vehicles			769	0.3	769	0.3	0.279	0.8	NA	0.3	2.4	0.06	0.11	0.06	37.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/ Forbes Street (Site Folder: Existing 2024 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing PM (Network Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forbes Street															
1	L2	All MCs	36	0.0	36	0.0	0.086	3.5	LOS A	0.4	2.9	0.14	0.41	0.14	38.1
2	T1	All MCs	20	0.0	20	0.0	0.086	0.1	LOS A	0.4	2.9	0.14	0.41	0.14	38.5
3	R2	All MCs	97	0.0	97	0.0	0.086	3.7	LOS A	0.4	2.9	0.14	0.41	0.14	37.1
Approach			153	0.0	153	0.0	0.086	3.2	NA	0.4	2.9	0.14	0.41	0.14	37.7
East: Lachlan Street															
4	L2	All MCs	163	0.6	163	0.6	0.494	7.0	LOS A	3.0	21.2	0.33	0.88	0.33	34.8
5	T1	All MCs	340	0.0	340	0.0	0.494	8.5	LOS A	3.0	21.2	0.33	0.88	0.33	34.7
6	R2	All MCs	16	0.0	16	0.0	0.494	10.4	LOS A	3.0	21.2	0.33	0.88	0.33	34.6
Approach			519	0.2	519	0.2	0.494	8.1	LOS A	3.0	21.2	0.33	0.88	0.33	34.7
North: Forbes Street															
7	L2	All MCs	12	0.0	12	0.0	0.037	3.5	LOS A	0.1	0.8	0.10	0.22	0.10	38.4
8	T1	All MCs	37	2.9	37	2.9	0.037	0.1	LOS A	0.1	0.8	0.10	0.22	0.10	39.2
9	R2	All MCs	18	5.9	18	5.9	0.037	3.7	LOS A	0.1	0.8	0.10	0.22	0.10	38.6
Approach			66	3.2	66	3.2	0.037	1.7	NA	0.1	0.8	0.10	0.22	0.10	38.9
West: Lachlan Street															
10	L2	All MCs	45	0.0	45	0.0	0.242	6.8	LOS A	1.0	7.4	0.26	0.91	0.26	36.1
11	T1	All MCs	113	0.9	113	0.9	0.242	7.8	LOS A	1.0	7.4	0.26	0.91	0.26	33.6
12	R2	All MCs	25	37.5	25	37.5	0.242	21.4	LOS B	1.0	7.4	0.26	0.91	0.26	35.9
Approach			183	5.7	183	5.7	0.242	9.4	LOS A	1.0	7.4	0.26	0.91	0.26	34.9
All Vehicles			921	1.5	921	1.5	0.494	7.1	NA	3.0	21.2	0.27	0.76	0.27	35.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Campbell Street/ Goulburn Street (Site Folder: Existing 2024 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 55 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Goulburn Street															
1	L2	All MCs	25	4.2	25	4.2	0.096	20.1	LOS B	1.0	7.2	0.78	0.64	0.78	33.0
2	T1	All MCs	94	2.2	94	2.2	0.377	20.4	LOS B	3.8	27.2	0.83	0.71	0.83	32.9
3	R2	All MCs	99	1.1	99	1.1	* 0.377	19.0	LOS B	3.8	27.2	0.85	0.73	0.85	32.5
Approach			218	1.9	218	1.9	0.377	19.7	LOS B	3.8	27.2	0.84	0.71	0.84	32.8
East: Campbell Street															
4	L2	All MCs	183	2.9	183	2.9	0.514	27.7	LOS B	4.5	32.6	0.93	0.79	0.93	31.2
5	T1	All MCs	106	6.9	106	6.9	0.349	24.5	LOS B	3.2	23.5	0.89	0.72	0.89	32.5
6	R2	All MCs	27	3.8	27	3.8	* 0.349	21.3	LOS B	3.2	23.5	0.89	0.72	0.89	32.2
Approach			317	4.3	317	4.3	0.514	26.1	LOS B	4.5	32.6	0.91	0.76	0.91	31.0
North: Goulburn Street															
7	L2	All MCs	20	0.0	20	0.0	0.059	19.9	LOS B	0.6	4.3	0.77	0.63	0.77	33.0
8	T1	All MCs	128	0.8	128	0.8	0.266	18.0	LOS B	2.9	20.8	0.82	0.67	0.82	33.5
9	R2	All MCs	16	13.3	16	13.3	0.266	15.7	LOS B	2.9	20.8	0.82	0.67	0.82	33.2
Approach			164	1.9	164	1.9	0.266	18.0	LOS B	2.9	20.8	0.81	0.66	0.81	33.4
West: Campbell Street															
10	L2	All MCs	35	9.1	35	9.1	0.091	22.7	LOS B	0.8	5.8	0.83	0.69	0.83	31.8
11	T1	All MCs	74	0.0	74	0.0	0.236	20.4	LOS B	2.1	15.2	0.86	0.69	0.86	32.7
12	R2	All MCs	19	11.1	19	11.1	0.236	21.1	LOS B	2.1	15.2	0.86	0.69	0.86	32.4
Approach			127	4.1	127	4.1	0.236	21.1	LOS B	2.1	15.2	0.85	0.69	0.85	32.4
All Vehicles			826	3.2	826	3.2	0.514	22.0	LOS B	4.5	32.6	0.86	0.72	0.86	32.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Goulburn Street												
P1	Full	163	172	22.0	LOS C	0.2	0.2	0.90	0.90	175.8	200.0	1.14
East: Campbell Street												

P2	Full	38	40	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
North: Goulburn Street												
P3	Full	98	103	21.9	LOS C	0.1	0.1	0.89	0.89	175.8	200.0	1.14
West: Campbell Street												
P4	Full	36	38	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
All Pedestrians		335	353	21.9	LOS C	0.2	0.2	0.90	0.90	175.8	200.0	1.14

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Hart Street/Lachlan Street (Site Folder: Opening Year 2028 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Opening Year 2028 AM (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	83	0.0	83	0.0	0.130	3.7	LOS A	0.7	4.8	0.48	0.52	0.48	35.9
6	R2	All MCs	44	0.0	44	0.0	0.130	7.2	LOS A	0.7	4.8	0.48	0.52	0.48	37.3
6u	U	All MCs	2	50.0	2	50.0	0.130	9.8	LOS A	0.7	4.8	0.48	0.52	0.48	37.1
Approach			129	0.8	129	0.8	0.130	5.0	LOS A	0.7	4.8	0.48	0.52	0.48	36.6
North: Hart Street															
7	L2	All MCs	245	0.0	245	0.0	0.464	8.2	LOS A	3.5	24.3	0.81	0.77	0.89	36.1
9	R2	All MCs	98	0.0	98	0.0	0.464	11.4	LOS A	3.5	24.3	0.81	0.77	0.89	33.4
9u	U	All MCs	7	0.0	7	0.0	0.464	12.8	LOS A	3.5	24.3	0.81	0.77	0.89	35.9
Approach			351	0.0	351	0.0	0.464	9.2	LOS A	3.5	24.3	0.81	0.77	0.89	35.6
West: Lachlan Street															
10	L2	All MCs	84	0.0	84	0.0	0.508	2.7	LOS A	4.5	31.5	0.29	0.41	0.29	36.5
11	T1	All MCs	447	0.5	447	0.5	0.508	2.4	LOS A	4.5	31.5	0.29	0.41	0.29	36.7
12u	U	All MCs	205	0.0	205	0.0	0.508	7.2	LOS A	4.5	31.5	0.29	0.41	0.29	28.6
Approach			737	0.3	737	0.3	0.508	3.8	LOS A	4.5	31.5	0.29	0.41	0.29	35.9
All Vehicles			1217	0.3	1217	0.3	0.508	5.5	LOS A	4.5	31.5	0.46	0.52	0.49	35.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/Drummond Street (Site Folder: Opening Year 2028 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Opening Year 2028 AM (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	340	0.0	340	0.0	0.192	0.3	LOS A	0.2	1.4	0.07	0.09	0.07	37.7
6	R2	All MCs	13	0.0	13	0.0	0.192	7.9	LOS A	0.2	1.4	0.07	0.09	0.07	38.6
Approach			353	0.0	353	0.0	0.192	0.6	NA	0.2	1.4	0.07	0.09	0.07	37.8
North: Drummond Street															
7	L2	All MCs	38	0.0	38	0.0	0.137	7.4	LOS A	0.4	3.1	0.69	0.83	0.69	33.1
9	R2	All MCs	28	0.0	28	0.0	0.137	12.7	LOS A	0.4	3.1	0.69	0.83	0.69	33.1
Approach			66	0.0	66	0.0	0.137	9.6	LOS A	0.4	3.1	0.69	0.83	0.69	33.1
West: Lachlan Street															
10	L2	All MCs	9	0.0	9	0.0	0.393	3.4	LOS A	0.0	0.0	0.00	0.01	0.00	39.1
11	T1	All MCs	756	0.3	756	0.3	0.393	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	39.7
Approach			765	0.3	765	0.3	0.393	0.1	NA	0.0	0.0	0.00	0.01	0.00	39.6
All Vehicles			1184	0.2	1184	0.2	0.393	0.8	NA	0.4	3.1	0.06	0.08	0.06	37.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101a [Lachlan Street/ Forbes Street (Site Folder: Opening Year 2028 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Opening Year 2028 AM (Network Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forbes Street															
1	L2	All MCs	48	2.2	48	2.2	0.954	41.2	LOS C	13.0	91.8	0.98	2.25	4.18	25.5
2	T1	All MCs	8	0.0	8	0.0	0.954	51.8	LOS D	13.0	91.8	0.98	2.25	4.18	25.5
3	R2	All MCs	262	0.4	262	0.4	0.954	54.8	LOS D	13.0	91.8	0.98	2.25	4.18	19.0
Approach			319	0.7	319	0.7	0.954	52.6	LOS D	13.0	91.8	0.98	2.25	4.18	20.6
East: Lachlan Street															
4	L2	All MCs	58	0.0	58	0.0	0.195	3.8	LOS A	0.1	0.9	0.05	0.12	0.05	38.7
5	T1	All MCs	304	0.0	304	0.0	0.195	0.1	LOS A	0.1	0.9	0.05	0.12	0.05	39.4
6	R2	All MCs	8	0.0	8	0.0	0.195	5.9	LOS A	0.1	0.9	0.05	0.12	0.05	38.5
Approach			371	0.0	371	0.0	0.195	0.8	NA	0.1	0.9	0.05	0.12	0.05	39.3
North: Forbes Street															
7	L2	All MCs	20	0.0	20	0.0	0.220	9.6	LOS A	0.8	5.5	0.70	1.03	0.75	30.8
8	T1	All MCs	32	3.3	32	3.3	0.220	16.5	LOS B	0.8	5.5	0.70	1.03	0.75	34.4
9	R2	All MCs	32	0.0	32	0.0	0.220	17.5	LOS B	0.8	5.5	0.70	1.03	0.75	34.3
Approach			83	1.3	83	1.3	0.220	15.2	LOS B	0.8	5.5	0.70	1.03	0.75	33.8
West: Lachlan Street															
10	L2	All MCs	40	0.0	40	0.0	0.304	4.7	LOS A	0.5	3.5	0.11	0.13	0.11	39.2
11	T1	All MCs	483	0.2	483	0.2	0.304	0.2	LOS A	0.5	3.5	0.11	0.13	0.11	39.3
12	R2	All MCs	32	26.7	32	26.7	0.304	6.0	LOS A	0.5	3.5	0.11	0.13	0.11	39.0
Approach			555	1.7	555	1.7	0.304	0.9	NA	0.5	3.5	0.11	0.13	0.11	39.2
All Vehicles			1327	1.0	1327	1.0	0.954	14.2	NA	13.0	91.8	0.34	0.70	1.11	32.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Campbell Street/ Goulburn Street (Site Folder: Opening Year 2028 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Goulburn Street															
1	L2	All MCs	23	4.5	23	4.5	0.142	19.6	LOS B	1.8	12.8	0.75	0.62	0.75	33.4
2	T1	All MCs	135	0.0	135	0.0	0.553	20.7	LOS B	7.0	49.4	0.82	0.71	0.82	33.0
3	R2	All MCs	207	0.5	207	0.5	* 0.553	20.3	LOS B	7.0	49.4	0.88	0.78	0.88	32.2
Approach			365	0.6	365	0.6	0.553	20.4	LOS B	7.0	49.4	0.85	0.74	0.85	32.6
East: Campbell Street															
4	L2	All MCs	80	6.6	80	6.6	0.208	25.1	LOS B	2.0	14.7	0.86	0.73	0.86	31.1
5	T1	All MCs	76	4.2	76	4.2	0.236	22.1	LOS B	2.3	16.7	0.86	0.69	0.86	32.2
6	R2	All MCs	16	6.7	16	6.7	0.236	22.8	LOS B	2.3	16.7	0.86	0.69	0.86	31.9
Approach			172	5.5	172	5.5	0.236	23.6	LOS B	2.3	16.7	0.86	0.71	0.86	31.7
North: Goulburn Street															
7	L2	All MCs	37	0.0	37	0.0	0.063	19.6	LOS B	0.8	5.3	0.73	0.66	0.73	32.8
8	T1	All MCs	71	1.5	71	1.5	0.170	17.6	LOS B	2.0	14.5	0.76	0.62	0.76	33.7
9	R2	All MCs	22	14.3	22	14.3	0.170	15.5	LOS B	2.0	14.5	0.76	0.62	0.76	33.4
Approach			129	3.3	129	3.3	0.170	17.8	LOS B	2.0	14.5	0.75	0.64	0.75	33.4
West: Campbell Street															
10	L2	All MCs	42	7.5	42	7.5	0.110	25.5	LOS B	1.0	7.6	0.83	0.70	0.83	31.3
11	T1	All MCs	188	0.6	188	0.6	0.502	24.6	LOS B	5.5	38.5	0.93	0.76	0.93	31.9
12	R2	All MCs	15	7.1	15	7.1	* 0.502	22.3	LOS B	5.5	38.5	0.93	0.76	0.93	31.6
Approach			245	2.1	245	2.1	0.502	24.6	LOS B	5.5	38.5	0.91	0.75	0.91	31.5
All Vehicles			912	2.3	912	2.3	0.553	21.8	LOS B	7.0	49.4	0.85	0.72	0.85	32.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Goulburn Street												
P1	Full	116	122	24.4	LOS C	0.2	0.2	0.90	0.90	178.3	200.0	1.12
East: Campbell Street												

P2	Full	43	45	24.3	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
North: Goulburn Street												
P3	Full	78	82	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
West: Campbell Street												
P4	Full	41	43	24.3	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		278	293	24.4	LOS C	0.2	0.2	0.90	0.90	178.2	200.0	1.12

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Hart Street/Lachlan Street (Site Folder: Opening Year 2028 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Opening Year 2028 PM (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	397	0.0	397	0.0	0.493	3.9	LOS A	3.6	25.4	0.58	0.52	0.58	35.7
6	R2	All MCs	145	0.0	145	0.0	0.493	7.4	LOS A	3.6	25.4	0.58	0.52	0.58	37.2
6u	U	All MCs	2	50.0	2	50.0	0.493	10.1	LOS A	3.6	25.4	0.58	0.52	0.58	37.1
Approach			544	0.2	544	0.2	0.493	4.9	LOS A	3.6	25.4	0.58	0.52	0.58	36.3
North: Hart Street															
7	L2	All MCs	53	0.0	53	0.0	0.141	3.7	LOS A	0.8	5.4	0.45	0.56	0.45	37.2
9	R2	All MCs	78	0.0	78	0.0	0.141	6.9	LOS A	0.8	5.4	0.45	0.56	0.45	35.4
9u	U	All MCs	18	0.0	18	0.0	0.141	8.2	LOS A	0.8	5.4	0.45	0.56	0.45	37.1
Approach			148	0.0	148	0.0	0.141	5.9	LOS A	0.8	5.4	0.45	0.56	0.45	36.5
West: Lachlan Street															
10	L2	All MCs	16	13.3	16	13.3	0.233	3.5	LOS A	1.4	10.1	0.40	0.53	0.40	35.6
11	T1	All MCs	99	2.1	99	2.1	0.233	3.0	LOS A	1.4	10.1	0.40	0.53	0.40	35.8
12u	U	All MCs	151	0.0	151	0.0	0.233	7.8	LOS A	1.4	10.1	0.40	0.53	0.40	26.4
Approach			265	1.6	265	1.6	0.233	5.8	LOS A	1.4	10.1	0.40	0.53	0.40	33.2
All Vehicles			958	0.5	958	0.5	0.493	5.3	LOS A	3.6	25.4	0.51	0.53	0.51	35.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/Drummond Street (Site Folder: Opening Year 2028 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Opening Year 2028 PM (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	661	0.2	661	0.2	0.370	0.1	LOS A	0.4	2.7	0.07	0.07	0.07	38.2
6	R2	All MCs	40	0.0	40	0.0	0.370	4.9	LOS A	0.4	2.7	0.07	0.07	0.07	38.7
Approach			701	0.2	701	0.2	0.370	0.4	NA	0.4	2.7	0.07	0.07	0.07	38.3
North: Drummond Street															
7	L2	All MCs	3	0.0	3	0.0	0.045	4.2	LOS A	0.1	1.0	0.59	0.73	0.59	33.4
9	R2	All MCs	18	0.0	18	0.0	0.045	10.0	LOS A	0.1	1.0	0.59	0.73	0.59	33.4
Approach			21	0.0	21	0.0	0.045	9.2	LOS A	0.1	1.0	0.59	0.73	0.59	33.4
West: Lachlan Street															
10	L2	All MCs	39	0.0	39	0.0	0.151	3.4	LOS A	0.0	0.0	0.00	0.06	0.00	38.9
11	T1	All MCs	254	0.4	254	0.4	0.151	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	38.3
Approach			293	0.4	293	0.4	0.151	0.5	NA	0.0	0.0	0.00	0.06	0.00	38.6
All Vehicles			1015	0.2	1015	0.2	0.370	0.6	NA	0.4	2.7	0.06	0.08	0.06	38.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/ Forbes Street (Site Folder: Opening Year 2028 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Opening Year 2028 PM (Network Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forbes Street															
1	L2	All MCs	13	0.0	13	0.0	0.165	9.4	LOS A	0.5	3.7	0.71	1.00	0.71	34.3
2	T1	All MCs	7	0.0	7	0.0	0.165	15.8	LOS B	0.5	3.7	0.71	1.00	0.71	34.2
3	R2	All MCs	36	0.0	36	0.0	0.165	17.8	LOS B	0.5	3.7	0.71	1.00	0.71	30.6
Approach			56	0.0	56	0.0	0.165	15.6	LOS B	0.5	3.7	0.71	1.00	0.71	32.4
East: Lachlan Street															
4	L2	All MCs	163	0.6	163	0.6	0.362	3.5	LOS A	0.2	1.5	0.04	0.14	0.04	38.5
5	T1	All MCs	512	0.0	512	0.0	0.362	0.1	LOS A	0.2	1.5	0.04	0.14	0.04	39.3
6	R2	All MCs	16	0.0	16	0.0	0.362	4.8	LOS A	0.2	1.5	0.04	0.14	0.04	38.3
Approach			691	0.2	691	0.2	0.362	1.0	NA	0.2	1.5	0.04	0.14	0.04	39.1
North: Forbes Street															
7	L2	All MCs	12	0.0	12	0.0	0.198	7.9	LOS A	0.7	4.7	0.68	1.03	0.71	30.2
8	T1	All MCs	37	2.9	37	2.9	0.198	18.7	LOS B	0.7	4.7	0.68	1.03	0.71	34.0
9	R2	All MCs	18	5.9	18	5.9	0.198	17.4	LOS B	0.7	4.7	0.68	1.03	0.71	33.9
Approach			66	3.2	66	3.2	0.198	16.5	LOS B	0.7	4.7	0.68	1.03	0.71	33.6
West: Lachlan Street															
10	L2	All MCs	45	0.0	45	0.0	0.199	7.1	LOS A	0.7	5.1	0.23	0.30	0.23	38.4
11	T1	All MCs	247	0.4	247	0.4	0.199	1.3	LOS A	0.7	5.1	0.23	0.30	0.23	37.8
12	R2	All MCs	25	37.5	25	37.5	0.199	9.7	LOS A	0.7	5.1	0.23	0.30	0.23	38.2
Approach			318	3.3	318	3.3	0.199	2.8	NA	0.7	5.1	0.23	0.30	0.23	38.0
All Vehicles			1131	1.2	1131	1.2	0.362	3.1	NA	0.7	5.1	0.16	0.28	0.16	37.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Campbell Street/ Goulburn Street (Site Folder: Opening Year 2028 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 55 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Goulburn Street															
1	L2	All MCs	24	0.0	24	0.0	0.091	20.8	LOS B	0.9	6.5	0.79	0.65	0.79	32.8
2	T1	All MCs	138	1.5	138	1.5	0.356	19.9	LOS B	3.7	26.0	0.85	0.71	0.85	32.9
3	R2	All MCs	42	0.0	42	0.0	* 0.356	18.1	LOS B	3.7	26.0	0.86	0.71	0.86	32.6
Approach			204	1.0	204	1.0	0.356	19.6	LOS B	3.7	26.0	0.85	0.70	0.85	32.9
East: Campbell Street															
4	L2	All MCs	183	2.9	183	2.9	0.467	26.1	LOS B	4.4	31.6	0.90	0.78	0.90	31.5
5	T1	All MCs	106	6.9	106	6.9	0.322	23.1	LOS B	3.1	22.8	0.87	0.71	0.87	32.8
6	R2	All MCs	27	3.8	27	3.8	* 0.322	19.2	LOS B	3.1	22.8	0.87	0.71	0.87	32.5
Approach			317	4.3	317	4.3	0.467	24.5	LOS B	4.4	31.6	0.89	0.75	0.89	31.4
North: Goulburn Street															
7	L2	All MCs	20	0.0	20	0.0	0.064	20.6	LOS B	0.6	4.4	0.79	0.64	0.79	32.7
8	T1	All MCs	128	0.8	128	0.8	0.286	18.9	LOS B	3.0	21.3	0.84	0.68	0.84	33.2
9	R2	All MCs	16	13.3	16	13.3	0.286	17.2	LOS B	3.0	21.3	0.84	0.68	0.84	32.9
Approach			164	1.9	164	1.9	0.286	18.9	LOS B	3.0	21.3	0.83	0.68	0.83	33.1
West: Campbell Street															
10	L2	All MCs	35	9.1	35	9.1	0.084	21.8	LOS B	0.7	5.6	0.81	0.68	0.81	32.1
11	T1	All MCs	32	0.0	32	0.0	0.125	19.4	LOS B	1.1	8.0	0.82	0.65	0.82	33.0
12	R2	All MCs	19	11.1	19	11.1	0.125	20.1	LOS B	1.1	8.0	0.82	0.65	0.82	32.7
Approach			85	6.2	85	6.2	0.125	20.5	LOS B	1.1	8.0	0.82	0.66	0.82	32.5
All Vehicles			771	3.1	771	3.1	0.467	21.6	LOS B	4.4	31.6	0.86	0.71	0.86	32.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Goulburn Street												
P1	Full	116	122	21.9	LOS C	0.2	0.2	0.90	0.90	175.8	200.0	1.14
East: Campbell Street												

P2	Full	43	45	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
North: Goulburn Street												
P3	Full	78	82	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
West: Campbell Street												
P4	Full	41	43	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
All Pedestrians		278	293	21.9	LOS C	0.2	0.2	0.89	0.89	175.8	200.0	1.14

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Hart Street/Lachlan Street (Site Folder: Ultimate Year 2038 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Ultimate Year 2038 AM + GPS Stage 2 (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	1	0.0	1	0.0	0.161	5.3	LOS A	0.9	6.5	0.65	0.69	0.65	33.6
6	R2	All MCs	83	0.0	83	0.0	0.161	8.8	LOS A	0.9	6.5	0.65	0.69	0.65	36.0
6u	U	All MCs	45	2.3	45	2.3	0.161	10.2	LOS A	0.9	6.5	0.65	0.69	0.65	36.0
Approach			129	0.8	129	0.8	0.161	9.2	LOS A	0.9	6.5	0.65	0.69	0.65	36.0
North: Hart Street															
7	L2	All MCs	245	0.0	245	0.0	0.712	17.3	LOS B	8.4	58.5	1.00	1.12	1.52	33.0
9	R2	All MCs	179	0.0	179	0.0	0.712	20.5	LOS B	8.4	58.5	1.00	1.12	1.52	28.6
9u	U	All MCs	7	0.0	7	0.0	0.712	21.8	LOS B	8.4	58.5	1.00	1.12	1.52	32.9
Approach			432	0.0	432	0.0	0.712	18.7	LOS B	8.4	58.5	1.00	1.12	1.52	31.7
West: Lachlan Street															
10	L2	All MCs	84	0.0	73	0.0	0.649	3.6	LOS A	6.9	48.3	0.60	0.52	0.60	35.5
11	T1	All MCs	447	0.5	386	0.4	0.649	3.4	LOS A	6.9	48.3	0.60	0.52	0.60	35.7
12u	U	All MCs	421	0.0	364	0.0	0.649	8.1	LOS A	6.9	48.3	0.60	0.52	0.60	25.9
Approach			953	0.2	822	0.2	0.649	5.5	LOS A	6.9	48.3	0.60	0.52	0.60	33.8
All Vehicles			1514	0.2	1384	0.2	0.712	10.0	LOS A	8.4	58.5	0.73	0.72	0.89	33.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/Drummond Street (Site Folder: Ultimate Year 2038 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Ultimate Year 2038 AM + GPS Stage 2 (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	600	0.0	545	0.0	0.311	0.5	LOS A	0.4	2.7	0.08	0.10	0.08	37.0
6	R2	All MCs	21	0.0	19	0.0	0.311	9.5	LOS A	0.4	2.7	0.08	0.10	0.08	38.5
Approach			621	0.0	564	0.0	0.311	0.8	NA	0.4	2.7	0.08	0.10	0.08	37.3
North: Drummond Street															
7	L2	All MCs	38	0.0	38	0.0	0.517	13.3	LOS A	2.0	13.7	0.90	1.08	1.28	26.9
9	R2	All MCs	91	0.0	91	0.0	0.517	26.3	LOS B	2.0	13.7	0.90	1.08	1.28	26.9
Approach			128	0.0	128	0.0	0.517	22.5	LOS B	2.0	13.7	0.90	1.08	1.28	26.9
West: Lachlan Street															
10	L2	All MCs	9	0.0	8	0.0	0.446	3.4	LOS A	0.0	0.0	0.00	0.00	0.00	39.0
11	T1	All MCs	1002	0.2	860	0.2	0.446	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	39.7
Approach			1012	0.2	868	0.2	0.446	0.1	NA	0.0	0.0	0.00	0.00	0.00	39.7
All Vehicles			1761	0.1	1560	0.1	0.517	2.2	NA	2.0	13.7	0.10	0.13	0.14	34.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101a [Lachlan Street/ Forbes Street (Site Folder: Ultimate Year 2038 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Ultimate Year 2038 AM + GPS Stage 2 (Network Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forbes Street															
1	L2	All MCs	57	1.9	57	1.9	2.207	1100.8	LOS F	112.1	789.3	1.00	7.33	19.01	3.0
3	R2	All MCs	262	0.4	262	0.4	2.207	1130.5	LOS F	112.1	789.3	1.00	7.33	19.01	1.6
Approach			319	0.7	319	0.7	2.207	1125.2	LOS F	112.1	789.3	1.00	7.33	19.01	1.8
East: Lachlan Street															
4	L2	All MCs	88	0.0	81	0.0	0.315	3.4	LOS A	0.0	0.0	0.00	0.06	0.00	38.8
5	T1	All MCs	576	0.0	530	0.0	0.315	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	39.6
Approach			664	0.0	611	0.0	0.315	0.5	NA	0.0	0.0	0.00	0.06	0.00	39.5
North: Forbes Street															
7	L2	All MCs	20	0.0	20	0.0	0.035	11.4	LOS A	0.1	0.8	0.61	0.95	0.61	32.8
Approach			20	0.0	20	0.0	0.035	11.4	LOS A	0.1	0.8	0.61	0.95	0.61	32.8
West: Lachlan Street															
10	L2	All MCs	41	2.6	41	2.6	0.444	7.0	LOS A	1.1	7.7	0.11	0.14	0.14	39.0
11	T1	All MCs	728	0.1	728	0.1	0.444	0.7	LOS A	1.1	7.7	0.11	0.14	0.14	38.9
12	R2	All MCs	32	26.7	32	26.7	0.444	9.1	LOS A	1.1	7.7	0.11	0.14	0.14	38.8
Approach			801	1.3	801	1.3	0.444	1.3	NA	1.1	7.7	0.11	0.14	0.14	38.9
All Vehicles			1804	0.7	1751	0.7	2.207	205.9	NA	112.1	789.3	0.24	1.43	3.54	8.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Campbell Street/ Goulburn Street (Site Folder: Ultimate Year 2038 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Goulburn Street															
1	L2	All MCs	23	4.5	23	4.5	0.157	18.9	LOS B	2.1	14.7	0.74	0.61	0.74	33.7
2	T1	All MCs	201	0.0	201	0.0	0.612	20.4	LOS B	8.4	59.1	0.83	0.72	0.83	33.1
3	R2	All MCs	207	0.5	207	0.5	* 0.612	19.2	LOS B	8.4	59.1	0.89	0.79	0.89	32.4
Approach			432	0.5	432	0.5	0.612	19.7	LOS B	8.4	59.1	0.86	0.75	0.86	32.8
East: Campbell Street															
4	L2	All MCs	80	6.6	80	6.6	0.225	26.1	LOS B	2.0	15.1	0.88	0.73	0.88	30.9
5	T1	All MCs	76	4.2	76	4.2	0.255	23.2	LOS B	2.4	17.1	0.88	0.70	0.88	31.9
6	R2	All MCs	16	6.7	16	6.7	0.255	23.7	LOS B	2.4	17.1	0.88	0.70	0.88	31.6
Approach			172	5.5	172	5.5	0.255	24.6	LOS B	2.4	17.1	0.88	0.71	0.88	31.4
North: Goulburn Street															
7	L2	All MCs	37	0.0	37	0.0	0.060	18.9	LOS B	0.7	5.2	0.71	0.66	0.71	33.0
8	T1	All MCs	71	1.5	71	1.5	0.158	16.3	LOS B	1.9	13.8	0.74	0.61	0.74	34.0
9	R2	All MCs	21	10.0	21	10.0	0.158	15.8	LOS B	1.9	13.8	0.74	0.61	0.74	33.7
Approach			128	2.5	128	2.5	0.158	17.0	LOS B	1.9	13.8	0.73	0.62	0.73	33.7
West: Campbell Street															
10	L2	All MCs	42	7.5	42	7.5	0.119	27.0	LOS B	1.0	7.8	0.85	0.70	0.85	31.0
11	T1	All MCs	188	0.6	188	0.6	0.546	26.2	LOS B	5.6	39.5	0.95	0.77	0.95	31.6
12	R2	All MCs	15	7.1	15	7.1	* 0.546	23.7	LOS B	5.6	39.5	0.95	0.77	0.95	31.3
Approach			245	2.1	245	2.1	0.546	26.2	LOS B	5.6	39.5	0.93	0.76	0.93	31.1
All Vehicles			977	2.0	977	2.0	0.612	21.8	LOS B	8.4	59.1	0.86	0.73	0.86	32.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Goulburn Street												
P1	Full	116	122	24.4	LOS C	0.2	0.2	0.90	0.90	178.3	200.0	1.12
East: Campbell Street												

P2	Full	43	45	24.3	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
North: Goulburn Street												
P3	Full	78	82	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
West: Campbell Street												
P4	Full	41	43	24.3	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		278	293	24.4	LOS C	0.2	0.2	0.90	0.90	178.2	200.0	1.12

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Hart Street/Lachlan Street (Site Folder: Ultimate Year 2038 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Ultimate Year 2038 PM + GPS Stage 2 (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	397	0.0	397	0.0	0.685	11.3	LOS A	7.7	53.8	0.91	0.95	1.24	31.8
6	R2	All MCs	145	0.0	145	0.0	0.685	14.7	LOS B	7.7	53.8	0.91	0.95	1.24	34.9
6u	U	All MCs	2	50.0	2	50.0	0.685	19.1	LOS B	7.7	53.8	0.91	0.95	1.24	34.8
Approach			544	0.2	544	0.2	0.685	12.2	LOS A	7.7	53.8	0.91	0.95	1.24	33.1
North: Hart Street															
7	L2	All MCs	53	0.0	53	0.0	0.285	5.5	LOS A	1.8	12.6	0.68	0.68	0.68	36.5
9	R2	All MCs	168	0.0	168	0.0	0.285	8.7	LOS A	1.8	12.6	0.68	0.68	0.68	34.2
9u	U	All MCs	18	0.0	18	0.0	0.285	10.0	LOS A	1.8	12.6	0.68	0.68	0.68	36.4
Approach			239	0.0	239	0.0	0.285	8.1	LOS A	1.8	12.6	0.68	0.68	0.68	35.2
West: Lachlan Street															
10	L2	All MCs	16	13.3	16	13.3	0.436	3.7	LOS A	3.5	24.5	0.51	0.57	0.51	34.9
11	T1	All MCs	99	2.1	99	2.1	0.436	3.2	LOS A	3.5	24.5	0.51	0.57	0.51	35.1
12u	U	All MCs	395	0.0	395	0.0	0.436	8.0	LOS A	3.5	24.5	0.51	0.57	0.51	25.0
Approach			509	0.8	509	0.8	0.436	6.9	LOS A	3.5	24.5	0.51	0.57	0.51	29.9
All Vehicles			1293	0.4	1293	0.4	0.685	9.4	LOS A	7.7	53.8	0.71	0.75	0.85	32.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/Drummond Street (Site Folder: Ultimate Year 2038 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Ultimate Year 2038 PM + GPS Stage 2 (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	953	0.1	953	0.1	0.546	0.7	LOS A	1.4	9.8	0.10	0.12	0.16	36.2
6	R2	All MCs	56	0.0	56	0.0	0.546	7.4	LOS A	1.4	9.8	0.10	0.12	0.16	38.3
Approach			1008	0.1	1008	0.1	0.546	1.0	NA	1.4	9.8	0.10	0.12	0.16	36.7
North: Drummond Street															
7	L2	All MCs	3	0.0	3	0.0	0.530	13.6	LOS A	1.7	12.0	0.94	1.08	1.27	22.2
9	R2	All MCs	72	1.5	72	1.5	0.530	37.7	LOS C	1.7	12.0	0.94	1.08	1.27	22.2
Approach			75	1.4	75	1.4	0.530	36.7	LOS C	1.7	12.0	0.94	1.08	1.27	22.2
West: Lachlan Street															
10	L2	All MCs	39	0.0	39	0.0	0.290	3.4	LOS A	0.0	0.0	0.00	0.03	0.00	39.0
11	T1	All MCs	524	0.2	524	0.2	0.290	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	39.0
Approach			563	0.2	563	0.2	0.290	0.3	NA	0.0	0.0	0.00	0.03	0.00	39.0
All Vehicles			1646	0.2	1646	0.2	0.546	2.4	NA	1.7	12.0	0.10	0.13	0.16	34.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/ Forbes Street (Site Folder: Ultimate Year 2038 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Ultimate Year 2038 PM + GPS Stage 2 (Network Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forbes Street															
1	L2	All MCs	20	0.0	20	0.0	0.477	22.1	LOS B	1.6	10.9	0.94	1.09	1.21	26.8
3	R2	All MCs	36	0.0	36	0.0	0.477	58.7	LOS E	1.6	10.9	0.94	1.09	1.21	20.5
Approach			56	0.0	56	0.0	0.477	45.5	LOS D	1.6	10.9	0.94	1.09	1.21	23.4
East: Lachlan Street															
4	L2	All MCs	199	0.5	199	0.5	0.537	3.4	LOS A	0.0	0.0	0.00	0.09	0.00	38.5
5	T1	All MCs	837	0.1	837	0.1	0.537	0.1	LOS A	0.0	0.0	0.00	0.09	0.00	39.3
Approach			1036	0.2	1036	0.2	0.537	0.7	NA	0.0	0.0	0.00	0.09	0.00	39.1
North: Forbes Street															
7	L2	All MCs	12	0.0	12	0.0	0.014	9.2	LOS A	0.1	0.4	0.50	0.86	0.50	34.0
Approach			12	0.0	12	0.0	0.014	9.2	LOS A	0.1	0.4	0.50	0.86	0.50	34.0
West: Lachlan Street															
10	L2	All MCs	45	0.0	45	0.0	0.405	17.7	LOS B	2.0	14.2	0.24	0.29	0.24	37.3
11	T1	All MCs	518	0.2	518	0.2	0.405	3.6	LOS A	2.0	14.2	0.24	0.29	0.24	35.8
12	R2	All MCs	25	37.5	25	37.5	0.405	22.1	LOS B	2.0	14.2	0.24	0.29	0.24	37.2
Approach			588	1.8	588	1.8	0.405	5.4	NA	2.0	14.2	0.24	0.29	0.24	36.1
All Vehicles			1692	0.7	1692	0.7	0.537	3.9	NA	2.0	14.2	0.12	0.20	0.13	37.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Campbell Street/ Goulburn Street (Site Folder: Ultimate Year 2038 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 55 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Goulburn Street															
1	L2	All MCs	24	0.0	24	0.0	0.096	20.0	LOS B	1.0	7.1	0.78	0.64	0.78	33.1
2	T1	All MCs	166	1.3	166	1.3	0.375	18.9	LOS B	4.1	29.1	0.84	0.70	0.84	33.2
3	R2	All MCs	42	0.0	42	0.0	* 0.375	17.3	LOS B	4.1	29.1	0.85	0.71	0.85	32.9
Approach			233	0.9	233	0.9	0.375	18.7	LOS B	4.1	29.1	0.84	0.70	0.84	33.1
East: Campbell Street															
4	L2	All MCs	183	2.9	183	2.9	0.514	27.7	LOS B	4.5	32.6	0.93	0.79	0.93	31.2
5	T1	All MCs	106	6.9	106	6.9	0.349	24.7	LOS B	3.2	23.5	0.89	0.72	0.89	32.5
6	R2	All MCs	27	3.8	27	3.8	* 0.349	20.6	LOS B	3.2	23.5	0.89	0.72	0.89	32.2
Approach			317	4.3	317	4.3	0.514	26.1	LOS B	4.5	32.6	0.91	0.76	0.91	31.0
North: Goulburn Street															
7	L2	All MCs	20	0.0	20	0.0	0.059	19.7	LOS B	0.6	4.3	0.77	0.63	0.77	33.0
8	T1	All MCs	128	0.8	128	0.8	0.267	17.8	LOS B	2.9	20.7	0.82	0.67	0.82	33.5
9	R2	All MCs	16	13.3	16	13.3	0.267	17.1	LOS B	2.9	20.7	0.82	0.67	0.82	33.2
Approach			164	1.9	164	1.9	0.267	18.0	LOS B	2.9	20.7	0.81	0.66	0.81	33.4
West: Campbell Street															
10	L2	All MCs	35	9.1	35	9.1	0.091	22.8	LOS B	0.8	5.8	0.83	0.69	0.83	31.8
11	T1	All MCs	32	0.0	32	0.0	0.135	20.4	LOS B	1.1	8.2	0.84	0.66	0.84	32.7
12	R2	All MCs	19	11.1	19	11.1	0.135	21.0	LOS B	1.1	8.2	0.84	0.66	0.84	32.4
Approach			85	6.2	85	6.2	0.135	21.5	LOS B	1.1	8.2	0.83	0.67	0.83	32.3
All Vehicles			799	3.0	799	3.0	0.514	21.8	LOS B	4.5	32.6	0.86	0.71	0.86	32.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Goulburn Street												
P1	Full	116	122	21.9	LOS C	0.2	0.2	0.90	0.90	175.8	200.0	1.14
East: Campbell Street												

P2	Full	43	45	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
North: Goulburn Street												
P3	Full	78	82	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
West: Campbell Street												
P4	Full	41	43	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
All Pedestrians		278	293	21.9	LOS C	0.2	0.2	0.89	0.89	175.8	200.0	1.14

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Hart Street/Lachlan Street (Site Folder: Ultimate Year 2038 AM (with Mitigation Measure))]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Ultimate Year 2038 AM (with Mitigation) (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	1	0.0	1	0.0	0.168	5.8	LOS A	1.0	6.9	0.68	0.71	0.68	33.3
6	R2	All MCs	83	0.0	83	0.0	0.168	9.2	LOS A	1.0	6.9	0.68	0.71	0.68	35.8
6u	U	All MCs	45	2.3	45	2.3	0.168	10.7	LOS A	1.0	6.9	0.68	0.71	0.68	35.8
Approach			129	0.8	129	0.8	0.168	9.7	LOS A	1.0	6.9	0.68	0.71	0.68	35.8
North: Hart Street															
7	L2	All MCs	245	0.0	245	0.0	0.622	11.9	LOS A	6.2	43.6	0.92	0.95	1.22	34.7
9	R2	All MCs	179	0.0	179	0.0	0.622	15.1	LOS B	6.2	43.6	0.92	0.95	1.22	31.2
9u	U	All MCs	7	0.0	7	0.0	0.622	16.4	LOS B	6.2	43.6	0.92	0.95	1.22	34.6
Approach			432	0.0	432	0.0	0.622	13.3	LOS A	6.2	43.6	0.92	0.95	1.22	33.7
West: Lachlan Street															
10	L2	All MCs	43	0.0	43	0.0	0.553	3.4	LOS A	5.1	35.7	0.52	0.53	0.52	35.3
11	T1	All MCs	228	0.9	228	0.9	0.553	3.2	LOS A	5.1	35.7	0.52	0.53	0.52	35.5
12u	U	All MCs	421	0.0	421	0.0	0.553	7.9	LOS A	5.1	35.7	0.52	0.53	0.52	25.7
Approach			693	0.3	693	0.3	0.553	6.1	LOS A	5.1	35.7	0.52	0.53	0.52	32.4
All Vehicles			1254	0.3	1254	0.3	0.622	8.9	LOS A	6.2	43.6	0.68	0.69	0.78	33.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/Drummond Street (Site Folder: Ultimate Year 2038 AM (with Mitigation Measure))]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Ultimate Year 2038 AM (with Mitigation) (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	600	0.0	600	0.0	0.336	0.3	LOS A	0.3	2.4	0.07	0.09	0.07	37.7
6	R2	All MCs	21	0.0	21	0.0	0.336	8.1	LOS A	0.3	2.4	0.07	0.09	0.07	38.6
Approach			621	0.0	621	0.0	0.336	0.6	NA	0.3	2.4	0.07	0.09	0.07	37.9
North: Drummond Street															
7	L2	All MCs	38	0.0	38	0.0	0.433	10.0	LOS A	1.6	11.4	0.85	1.03	1.14	28.8
9	R2	All MCs	91	0.0	91	0.0	0.433	21.3	LOS B	1.6	11.4	0.85	1.03	1.14	28.8
Approach			128	0.0	128	0.0	0.433	18.0	LOS B	1.6	11.4	0.85	1.03	1.14	28.8
West: Lachlan Street															
10	L2	All MCs	9	0.0	9	0.0	0.385	3.4	LOS A	0.0	0.0	0.00	0.01	0.00	39.1
11	T1	All MCs	740	0.1	740	0.1	0.385	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	39.7
Approach			749	0.1	749	0.1	0.385	0.1	NA	0.0	0.0	0.00	0.01	0.00	39.6
All Vehicles			1499	0.1	1499	0.1	0.433	1.8	NA	1.6	11.4	0.10	0.13	0.13	35.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101a [Lachlan Street/ Forbes Street (Site Folder: Ultimate Year 2038 AM (with Mitigation Measure))]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Ultimate Year 2038 AM (with Mitigation) (Network Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forbes Street															
1	L2	All MCs	318	0.7	318	0.7	0.454	12.5	LOS A	2.6	18.1	0.66	1.13	0.95	35.3
Approach			318	0.7	318	0.7	0.454	12.5	LOS A	2.6	18.1	0.66	1.13	0.95	35.3
East: Lachlan Street															
4	L2	All MCs	88	0.0	88	0.0	0.357	3.4	LOS A	0.0	0.0	0.00	0.06	0.00	38.8
5	T1	All MCs	604	0.0	604	0.0	0.357	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	39.6
Approach			693	0.0	693	0.0	0.357	0.5	NA	0.0	0.0	0.00	0.06	0.00	39.5
North: Forbes Street															
7	L2	All MCs	20	0.0	20	0.0	0.035	11.4	LOS A	0.1	0.8	0.61	0.95	0.61	32.8
Approach			20	0.0	20	0.0	0.035	11.4	LOS A	0.1	0.8	0.61	0.95	0.61	32.8
West: Lachlan Street															
10	L2	All MCs	40	0.0	40	0.0	0.451	8.1	LOS A	1.3	9.4	0.12	0.16	0.17	38.8
11	T1	All MCs	728	0.1	728	0.1	0.451	1.0	LOS A	1.3	9.4	0.12	0.16	0.17	38.6
12	R2	All MCs	32	26.7	32	26.7	0.451	10.4	LOS A	1.3	9.4	0.12	0.16	0.17	38.6
Approach			800	1.2	800	1.2	0.451	1.7	NA	1.3	9.4	0.12	0.16	0.17	38.6
All Vehicles			1831	0.6	1831	0.6	0.454	3.2	NA	2.6	18.1	0.17	0.30	0.25	37.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Campbell Street/ Goulburn Street (Site Folder: Ultimate Year 2038 AM (with Mitigation Measure))]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Goulburn Street															
1	L2	All MCs	23	4.5	23	4.5	0.144	18.9	LOS B	1.9	13.5	0.73	0.61	0.73	33.7
2	T1	All MCs	163	0.0	163	0.0	0.564	20.1	LOS B	7.5	52.7	0.81	0.71	0.81	33.2
3	R2	All MCs	207	0.5	207	0.5	* 0.564	19.3	LOS B	7.5	52.7	0.87	0.78	0.87	32.4
Approach			394	0.5	394	0.5	0.564	19.6	LOS B	7.5	52.7	0.84	0.74	0.84	32.8
East: Campbell Street															
4	L2	All MCs	80	6.6	80	6.6	0.225	26.1	LOS B	2.0	15.1	0.88	0.73	0.88	30.9
5	T1	All MCs	76	4.2	76	4.2	0.255	23.2	LOS B	2.4	17.1	0.88	0.70	0.88	31.9
6	R2	All MCs	16	6.7	16	6.7	0.255	23.7	LOS B	2.4	17.1	0.88	0.70	0.88	31.6
Approach			172	5.5	172	5.5	0.255	24.6	LOS B	2.4	17.1	0.88	0.71	0.88	31.4
North: Goulburn Street															
7	L2	All MCs	37	0.0	37	0.0	0.060	18.9	LOS B	0.7	5.2	0.71	0.66	0.71	33.0
8	T1	All MCs	71	1.5	71	1.5	0.157	16.5	LOS B	1.9	13.8	0.74	0.61	0.74	34.0
9	R2	All MCs	21	10.0	21	10.0	0.157	15.3	LOS B	1.9	13.8	0.74	0.61	0.74	33.7
Approach			128	2.5	128	2.5	0.157	17.0	LOS B	1.9	13.8	0.73	0.62	0.73	33.7
West: Campbell Street															
10	L2	All MCs	42	7.5	42	7.5	0.119	26.8	LOS B	1.0	7.8	0.85	0.70	0.85	31.0
11	T1	All MCs	187	0.0	187	0.0	0.540	25.9	LOS B	5.6	39.1	0.95	0.77	0.95	31.6
12	R2	All MCs	15	7.1	15	7.1	* 0.540	23.5	LOS B	5.6	39.1	0.95	0.77	0.95	31.3
Approach			244	1.7	244	1.7	0.540	25.9	LOS B	5.6	39.1	0.93	0.76	0.93	31.1
All Vehicles			938	2.0	938	2.0	0.564	21.8	LOS B	7.5	52.7	0.86	0.73	0.86	32.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Goulburn Street												
P1	Full	116	122	24.4	LOS C	0.2	0.2	0.90	0.90	178.3	200.0	1.12
East: Campbell Street												

P2	Full	43	45	24.3	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
North: Goulburn Street												
P3	Full	78	82	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
West: Campbell Street												
P4	Full	41	43	24.3	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		278	293	24.4	LOS C	0.2	0.2	0.90	0.90	178.2	200.0	1.12

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Hart Street/Lachlan Street (Site Folder: Ultimate Year 2038 PM (with Mitigation Measure))]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Ultimate Year 2038 PM (with Mitigation) (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	397	0.0	397	0.0	0.681	11.2	LOS A	7.6	53.2	0.90	0.95	1.23	31.9
6	R2	All MCs	145	0.0	145	0.0	0.681	14.6	LOS B	7.6	53.2	0.90	0.95	1.23	35.0
6u	U	All MCs	2	50.0	2	50.0	0.681	19.0	LOS B	7.6	53.2	0.90	0.95	1.23	34.8
Approach			544	0.2	544	0.2	0.681	12.1	LOS A	7.6	53.2	0.90	0.95	1.23	33.1
North: Hart Street															
7	L2	All MCs	53	0.0	53	0.0	0.276	5.3	LOS A	1.7	12.1	0.65	0.66	0.65	36.6
9	R2	All MCs	168	0.0	168	0.0	0.276	8.5	LOS A	1.7	12.1	0.65	0.66	0.65	34.3
9u	U	All MCs	18	0.0	18	0.0	0.276	9.8	LOS A	1.7	12.1	0.65	0.66	0.65	36.5
Approach			239	0.0	239	0.0	0.276	7.9	LOS A	1.7	12.1	0.65	0.66	0.65	35.3
West: Lachlan Street															
10	L2	All MCs	12	18.2	12	18.2	0.407	3.7	LOS A	3.1	22.2	0.50	0.57	0.50	34.8
11	T1	All MCs	68	3.1	68	3.1	0.407	3.2	LOS A	3.1	22.2	0.50	0.57	0.50	35.0
12u	U	All MCs	395	0.0	395	0.0	0.407	7.9	LOS A	3.1	22.2	0.50	0.57	0.50	24.9
Approach			475	0.9	475	0.9	0.407	7.2	LOS A	3.1	22.2	0.50	0.57	0.50	28.8
All Vehicles			1258	0.4	1258	0.4	0.681	9.4	LOS A	7.6	53.2	0.70	0.75	0.85	32.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/Drummond Street (Site Folder: Ultimate Year 2038 PM (with Mitigation Measure))]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Ultimate Year 2038 PM (with Mitigation) (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	953	0.1	953	0.1	0.544	0.6	LOS A	1.3	9.2	0.09	0.11	0.15	36.5
6	R2	All MCs	56	0.0	56	0.0	0.544	7.1	LOS A	1.3	9.2	0.09	0.11	0.15	38.4
Approach			1008	0.1	1008	0.1	0.544	0.9	NA	1.3	9.2	0.09	0.11	0.15	37.0
North: Drummond Street															
7	L2	All MCs	3	0.0	3	0.0	0.497	12.0	LOS A	1.6	11.2	0.93	1.06	1.23	23.1
9	R2	All MCs	72	1.5	72	1.5	0.497	34.6	LOS C	1.6	11.2	0.93	1.06	1.23	23.1
Approach			75	1.4	75	1.4	0.497	33.6	LOS C	1.6	11.2	0.93	1.06	1.23	23.1
West: Lachlan Street															
10	L2	All MCs	39	0.0	39	0.0	0.272	3.4	LOS A	0.0	0.0	0.00	0.03	0.00	39.0
11	T1	All MCs	489	0.2	489	0.2	0.272	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	39.0
Approach			528	0.2	528	0.2	0.272	0.3	NA	0.0	0.0	0.00	0.03	0.00	39.0
All Vehicles			1612	0.2	1612	0.2	0.544	2.2	NA	1.6	11.2	0.10	0.13	0.15	34.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/ Forbes Street (Site Folder: Ultimate Year 2038 PM (with Mitigation Measure))]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Ultimate Year 2038 PM (with Mitigation) (Network Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forbes Street															
1	L2	All MCs	56	0.0	56	0.0	0.119	13.3	LOS A	0.4	2.9	0.70	1.00	0.70	35.0
Approach			56	0.0	56	0.0	0.119	13.3	LOS A	0.4	2.9	0.70	1.00	0.70	35.0
East: Lachlan Street															
4	L2	All MCs	199	0.5	199	0.5	0.537	3.4	LOS A	0.0	0.0	0.00	0.09	0.00	38.5
5	T1	All MCs	837	0.1	837	0.1	0.537	0.1	LOS A	0.0	0.0	0.00	0.09	0.00	39.3
Approach			1036	0.2	1036	0.2	0.537	0.7	NA	0.0	0.0	0.00	0.09	0.00	39.1
North: Forbes Street															
7	L2	All MCs	12	0.0	12	0.0	0.014	9.2	LOS A	0.1	0.4	0.50	0.86	0.50	34.0
Approach			12	0.0	12	0.0	0.014	9.2	LOS A	0.1	0.4	0.50	0.86	0.50	34.0
West: Lachlan Street															
10	L2	All MCs	45	0.0	45	0.0	0.405	17.7	LOS B	2.0	14.2	0.24	0.29	0.24	37.3
11	T1	All MCs	518	0.2	518	0.2	0.405	3.6	LOS A	2.0	14.2	0.24	0.29	0.24	35.8
12	R2	All MCs	25	37.5	25	37.5	0.405	22.1	LOS B	2.0	14.2	0.24	0.29	0.24	37.2
Approach			588	1.8	588	1.8	0.405	5.4	NA	2.0	14.2	0.24	0.29	0.24	36.1
All Vehicles			1692	0.7	1692	0.7	0.537	2.8	NA	2.0	14.2	0.11	0.19	0.11	37.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Campbell Street/ Goulburn Street (Site Folder: Ultimate Year 2038 PM (with Mitigation Measure))]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 55 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Goulburn Street															
1	L2	All MCs	24	0.0	24	0.0	0.096	20.0	LOS B	1.0	7.1	0.78	0.64	0.78	33.1
2	T1	All MCs	166	1.3	166	1.3	0.375	18.9	LOS B	4.1	29.1	0.84	0.70	0.84	33.2
3	R2	All MCs	42	0.0	42	0.0	* 0.375	17.3	LOS B	4.1	29.1	0.85	0.71	0.85	32.9
Approach			233	0.9	233	0.9	0.375	18.7	LOS B	4.1	29.1	0.84	0.70	0.84	33.1
East: Campbell Street															
4	L2	All MCs	183	2.9	183	2.9	0.514	27.7	LOS B	4.5	32.6	0.93	0.79	0.93	31.2
5	T1	All MCs	106	6.9	106	6.9	0.349	24.7	LOS B	3.2	23.5	0.89	0.72	0.89	32.5
6	R2	All MCs	27	3.8	27	3.8	* 0.349	20.6	LOS B	3.2	23.5	0.89	0.72	0.89	32.2
Approach			317	4.3	317	4.3	0.514	26.1	LOS B	4.5	32.6	0.91	0.76	0.91	31.0
North: Goulburn Street															
7	L2	All MCs	20	0.0	20	0.0	0.059	19.7	LOS B	0.6	4.3	0.77	0.63	0.77	33.0
8	T1	All MCs	128	0.8	128	0.8	0.267	17.8	LOS B	2.9	20.7	0.82	0.67	0.82	33.5
9	R2	All MCs	16	13.3	16	13.3	0.267	17.1	LOS B	2.9	20.7	0.82	0.67	0.82	33.2
Approach			164	1.9	164	1.9	0.267	18.0	LOS B	2.9	20.7	0.81	0.66	0.81	33.4
West: Campbell Street															
10	L2	All MCs	35	9.1	35	9.1	0.091	22.8	LOS B	0.8	5.8	0.83	0.69	0.83	31.8
11	T1	All MCs	32	0.0	32	0.0	0.135	20.4	LOS B	1.1	8.2	0.84	0.66	0.84	32.7
12	R2	All MCs	19	11.1	19	11.1	0.135	21.0	LOS B	1.1	8.2	0.84	0.66	0.84	32.4
Approach			85	6.2	85	6.2	0.135	21.5	LOS B	1.1	8.2	0.83	0.67	0.83	32.3
All Vehicles			799	3.0	799	3.0	0.514	21.8	LOS B	4.5	32.6	0.86	0.71	0.86	32.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Goulburn Street												
P1	Full	116	122	21.9	LOS C	0.2	0.2	0.90	0.90	175.8	200.0	1.14
East: Campbell Street												

P2	Full	43	45	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
North: Goulburn Street												
P3	Full	78	82	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
West: Campbell Street												
P4	Full	41	43	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
All Pedestrians		278	293	21.9	LOS C	0.2	0.2	0.89	0.89	175.8	200.0	1.14

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/ Primary School Access (Site Folder: Existing 2024 AM w GPS Access)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing w HS car park AM (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: GPS Access															
1	L2	All MCs	29	0.0	29	0.0	0.020	5.9	LOS A	0.1	0.6	0.23	0.54	0.23	37.2
Approach			29	0.0	29	0.0	0.020	5.9	LOS A	0.1	0.6	0.23	0.54	0.23	37.2
East: Lachlan Street															
4	L2	All MCs	174	0.0	174	0.0	0.166	2.5	LOS A	0.0	0.0	0.00	0.29	0.00	44.3
5	T1	All MCs	141	0.0	141	0.0	0.166	0.0	LOS A	0.0	0.0	0.00	0.29	0.00	33.1
Approach			315	0.0	315	0.0	0.166	1.4	NA	0.0	0.0	0.00	0.29	0.00	42.7
West: Lachlan Street															
11	T1	All MCs	643	0.3	643	0.3	0.478	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.5
Approach			643	0.3	643	0.3	0.478	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.5
All Vehicles			987	0.2	987	0.2	0.478	0.6	NA	0.1	0.6	0.01	0.11	0.01	50.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Hart Street/Lachlan Street (Site Folder: Existing 2024 AM w GPS Access)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing w HS car park AM (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	1	0.0	1	0.0	0.125	3.3	LOS A	0.7	4.9	0.45	0.60	0.45	34.5
6	R2	All MCs	83	0.0	83	0.0	0.125	6.7	LOS A	0.7	4.9	0.45	0.60	0.45	36.5
6u	U	All MCs	45	2.3	45	2.3	0.125	8.1	LOS A	0.7	4.9	0.45	0.60	0.45	36.5
Approach			129	0.8	129	0.8	0.125	7.2	LOS A	0.7	4.9	0.45	0.60	0.45	36.5
North: Hart Street															
7	L2	All MCs	245	0.0	245	0.0	0.529	7.9	LOS A	4.4	30.8	0.81	0.78	0.93	36.1
9	R2	All MCs	174	0.0	174	0.0	0.529	11.0	LOS A	4.4	30.8	0.81	0.78	0.93	33.4
9u	U	All MCs	7	0.0	7	0.0	0.529	12.4	LOS A	4.4	30.8	0.81	0.78	0.93	35.9
Approach			426	0.0	426	0.0	0.529	9.2	LOS A	4.4	30.8	0.81	0.78	0.93	35.3
West: Lachlan Street															
10	L2	All MCs	132	0.0	132	0.0	0.506	2.2	LOS A	4.2	29.3	0.47	0.42	0.47	37.1
11	T1	All MCs	447	0.5	447	0.5	0.506	2.3	LOS A	4.2	29.3	0.47	0.42	0.47	37.3
12u	U	All MCs	57	0.0	57	0.0	0.506	6.5	LOS A	4.2	29.3	0.47	0.42	0.47	21.1
Approach			636	0.3	636	0.3	0.506	2.7	LOS A	4.2	29.3	0.47	0.42	0.47	37.1
All Vehicles			1192	0.3	1192	0.3	0.529	5.5	LOS A	4.4	30.8	0.59	0.57	0.63	36.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/Drummond Street (Site Folder: Existing 2024 AM w GPS Access)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing w HS car park AM (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	149	0.0	149	0.0	0.093	0.6	LOS A	0.2	1.2	0.14	0.16	0.14	35.3
6	R2	All MCs	13	0.0	13	0.0	0.093	7.1	LOS A	0.2	1.2	0.14	0.16	0.14	38.2
Approach			162	0.0	162	0.0	0.093	1.1	NA	0.2	1.2	0.14	0.16	0.14	36.3
North: Drummond Street															
7	L2	All MCs	38	0.0	38	0.0	0.103	6.5	LOS A	0.3	2.4	0.58	0.78	0.58	34.4
9	R2	All MCs	28	0.0	28	0.0	0.103	8.9	LOS A	0.3	2.4	0.58	0.78	0.58	34.4
Approach			66	0.0	66	0.0	0.103	7.5	LOS A	0.3	2.4	0.58	0.78	0.58	34.4
West: Lachlan Street															
10	L2	All MCs	57	0.0	57	0.0	0.368	3.4	LOS A	0.0	0.0	0.00	0.04	0.00	38.9
11	T1	All MCs	656	0.3	656	0.3	0.368	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	38.9
Approach			713	0.3	713	0.3	0.368	0.3	NA	0.0	0.0	0.00	0.04	0.00	38.9
All Vehicles			941	0.2	941	0.2	0.368	0.9	NA	0.3	2.4	0.06	0.11	0.06	37.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/ Forbes Street (Site Folder: Existing 2024 AM w GPS Access)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing w HS car park AM (Network Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forbes Street															
1	L2	All MCs	65	1.6	65	1.6	0.249	3.6	LOS A	1.4	9.8	0.17	0.45	0.17	37.9
2	T1	All MCs	12	0.0	12	0.0	0.249	0.2	LOS A	1.4	9.8	0.17	0.45	0.17	38.3
3	R2	All MCs	357	0.3	357	0.3	0.249	3.7	LOS A	1.4	9.8	0.17	0.45	0.17	36.8
Approach			434	0.5	434	0.5	0.249	3.6	NA	1.4	9.8	0.17	0.45	0.17	37.1
East: Lachlan Street															
4	L2	All MCs	58	0.0	58	0.0	0.237	6.8	LOS A	1.0	7.0	0.32	0.88	0.32	33.9
5	T1	All MCs	114	0.0	114	0.0	0.237	10.6	LOS A	1.0	7.0	0.32	0.88	0.32	33.9
6	R2	All MCs	8	0.0	8	0.0	0.237	16.4	LOS B	1.0	7.0	0.32	0.88	0.32	33.7
Approach			180	0.0	180	0.0	0.237	9.7	LOS A	1.0	7.0	0.32	0.88	0.32	33.9
North: Forbes Street															
7	L2	All MCs	20	0.0	20	0.0	0.046	3.6	LOS A	0.2	1.3	0.15	0.31	0.15	37.8
8	T1	All MCs	32	3.3	32	3.3	0.046	0.1	LOS A	0.2	1.3	0.15	0.31	0.15	38.8
9	R2	All MCs	32	0.0	32	0.0	0.046	3.8	LOS A	0.2	1.3	0.15	0.31	0.15	38.3
Approach			83	1.3	83	1.3	0.046	2.3	NA	0.2	1.3	0.15	0.31	0.15	38.4
West: Lachlan Street															
10	L2	All MCs	40	0.0	40	0.0	0.612	11.0	LOS A	9.5	68.1	0.57	0.91	0.87	33.6
11	T1	All MCs	335	0.3	335	0.3	0.612	17.4	LOS B	9.5	68.1	0.57	0.91	0.87	29.5
12	R2	All MCs	32	26.7	32	26.7	0.612	28.8	LOS C	9.5	68.1	0.57	0.91	0.87	33.4
Approach			406	2.3	406	2.3	0.612	17.7	LOS B	9.5	68.1	0.57	0.91	0.87	30.6
All Vehicles			1103	1.1	1103	1.1	0.612	9.7	NA	9.5	68.1	0.34	0.68	0.45	34.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/ Primary School Access (Site Folder: Existing 2024 PM w GPS access)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing w HS car park PM (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Primary School Access															
1	L2	All MCs	133	0.8	133	0.8	0.128	7.4	LOS A	0.5	3.5	0.47	0.69	0.47	35.1
Approach			133	0.8	133	0.8	0.128	7.4	LOS A	0.5	3.5	0.47	0.69	0.47	35.1
East: Lachlan Street															
4	L2	All MCs	3	0.0	3	0.0	0.238	2.5	LOS A	0.0	0.0	0.00	0.00	0.00	48.4
5	T1	All MCs	460	0.0	460	0.0	0.238	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.2
Approach			463	0.0	463	0.0	0.238	0.0	NA	0.0	0.0	0.00	0.00	0.00	58.6
West: Lachlan Street															
11	T1	All MCs	161	1.3	161	1.3	0.083	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach			161	1.3	161	1.3	0.083	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles			757	0.4	757	0.4	0.238	1.3	NA	0.5	3.5	0.08	0.12	0.08	44.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Hart Street/Lachlan Street (Site Folder: Existing 2024 PM w GPS access)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing w HS car park PM (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	397	0.0	397	0.0	0.394	2.5	LOS A	2.8	19.3	0.29	0.39	0.29	36.7
6	R2	All MCs	145	0.0	145	0.0	0.394	5.9	LOS A	2.8	19.3	0.29	0.39	0.29	37.8
6u	U	All MCs	1	0.0	1	0.0	0.394	7.3	LOS A	2.8	19.3	0.29	0.39	0.29	37.8
Approach			543	0.0	543	0.0	0.394	3.4	LOS A	2.8	19.3	0.29	0.39	0.29	37.1
North: Hart Street															
7	L2	All MCs	53	0.0	53	0.0	0.094	2.9	LOS A	0.5	3.4	0.29	0.50	0.29	37.6
9	R2	All MCs	41	0.0	41	0.0	0.094	6.1	LOS A	0.5	3.4	0.29	0.50	0.29	36.0
9u	U	All MCs	18	0.0	18	0.0	0.094	7.4	LOS A	0.5	3.4	0.29	0.50	0.29	37.4
Approach			112	0.0	112	0.0	0.094	4.8	LOS A	0.5	3.4	0.29	0.50	0.29	37.2
West: Lachlan Street															
10	L2	All MCs	46	4.5	46	4.5	0.144	2.1	LOS A	0.8	5.4	0.35	0.41	0.35	37.3
11	T1	All MCs	99	2.1	99	2.1	0.144	2.2	LOS A	0.8	5.4	0.35	0.41	0.35	37.5
12u	U	All MCs	16	0.0	16	0.0	0.144	6.3	LOS A	0.8	5.4	0.35	0.41	0.35	22.0
Approach			161	2.6	161	2.6	0.144	2.6	LOS A	0.8	5.4	0.35	0.41	0.35	37.3
All Vehicles			816	0.5	816	0.5	0.394	3.5	LOS A	2.8	19.3	0.30	0.41	0.30	37.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/Drummond Street (Site Folder: Existing 2024 PM w GPS access)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing w HS car park PM (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Lachlan Street															
5	T1	All MCs	607	0.2	607	0.2	0.340	0.1	LOS A	0.4	2.5	0.06	0.07	0.06	37.9
6	R2	All MCs	40	0.0	40	0.0	0.340	4.5	LOS A	0.4	2.5	0.06	0.07	0.06	38.7
Approach			647	0.2	647	0.2	0.340	0.4	NA	0.4	2.5	0.06	0.07	0.06	38.1
North: Drummond Street															
7	L2	All MCs	3	0.0	3	0.0	0.037	3.8	LOS A	0.1	0.8	0.53	0.65	0.53	34.3
9	R2	All MCs	18	0.0	18	0.0	0.037	8.4	LOS A	0.1	0.8	0.53	0.65	0.53	34.3
Approach			21	0.0	21	0.0	0.037	7.7	LOS A	0.1	0.8	0.53	0.65	0.53	34.3
West: Lachlan Street															
10	L2	All MCs	69	0.0	69	0.0	0.114	3.4	LOS A	0.0	0.0	0.00	0.15	0.00	38.5
11	T1	All MCs	149	0.7	149	0.7	0.114	0.0	LOS A	0.0	0.0	0.00	0.15	0.00	36.2
Approach			219	0.5	219	0.5	0.114	1.1	NA	0.0	0.0	0.00	0.15	0.00	37.8
All Vehicles			887	0.2	887	0.2	0.340	0.7	NA	0.4	2.5	0.06	0.10	0.06	37.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lachlan Street/ Forbes Street (Site Folder: Existing 2024 PM w GPS access)]

Output produced by SIDRA INTERSECTION Version: 9.1.5.224

Network: N101 [Existing w HS car park PM (Network Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Forbes Street															
1	L2	All MCs	36	0.0	36	0.0	0.086	3.5	LOS A	0.4	2.9	0.14	0.41	0.14	38.1
2	T1	All MCs	20	0.0	20	0.0	0.086	0.1	LOS A	0.4	2.9	0.14	0.41	0.14	38.5
3	R2	All MCs	97	0.0	97	0.0	0.086	3.7	LOS A	0.4	2.9	0.14	0.41	0.14	37.1
Approach			153	0.0	153	0.0	0.086	3.2	NA	0.4	2.9	0.14	0.41	0.14	37.7
East: Lachlan Street															
4	L2	All MCs	163	0.6	163	0.6	0.617	7.8	LOS A	6.5	45.3	0.43	0.87	0.48	34.2
5	T1	All MCs	458	0.0	458	0.0	0.617	9.8	LOS A	6.5	45.3	0.43	0.87	0.48	34.2
6	R2	All MCs	16	0.0	16	0.0	0.617	12.2	LOS A	6.5	45.3	0.43	0.87	0.48	34.0
Approach			637	0.2	637	0.2	0.617	9.3	LOS A	6.5	45.3	0.43	0.87	0.48	34.2
North: Forbes Street															
7	L2	All MCs	12	0.0	12	0.0	0.037	3.5	LOS A	0.1	0.8	0.10	0.22	0.10	38.4
8	T1	All MCs	37	2.9	37	2.9	0.037	0.1	LOS A	0.1	0.8	0.10	0.22	0.10	39.2
9	R2	All MCs	18	5.9	18	5.9	0.037	3.7	LOS A	0.1	0.8	0.10	0.22	0.10	38.6
Approach			66	3.2	66	3.2	0.037	1.7	NA	0.1	0.8	0.10	0.22	0.10	38.9
West: Lachlan Street															
10	L2	All MCs	45	0.0	45	0.0	0.272	6.8	LOS A	1.1	8.3	0.29	0.89	0.29	35.8
11	T1	All MCs	113	0.9	113	0.9	0.272	7.8	LOS A	1.1	8.3	0.29	0.89	0.29	33.1
12	R2	All MCs	25	37.5	25	37.5	0.272	28.2	LOS B	1.1	8.3	0.29	0.89	0.29	35.6
Approach			183	5.7	183	5.7	0.272	10.4	LOS A	1.1	8.3	0.29	0.89	0.29	34.5
All Vehicles			1039	1.3	1039	1.3	0.617	8.1	NA	6.5	45.3	0.34	0.77	0.37	35.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.